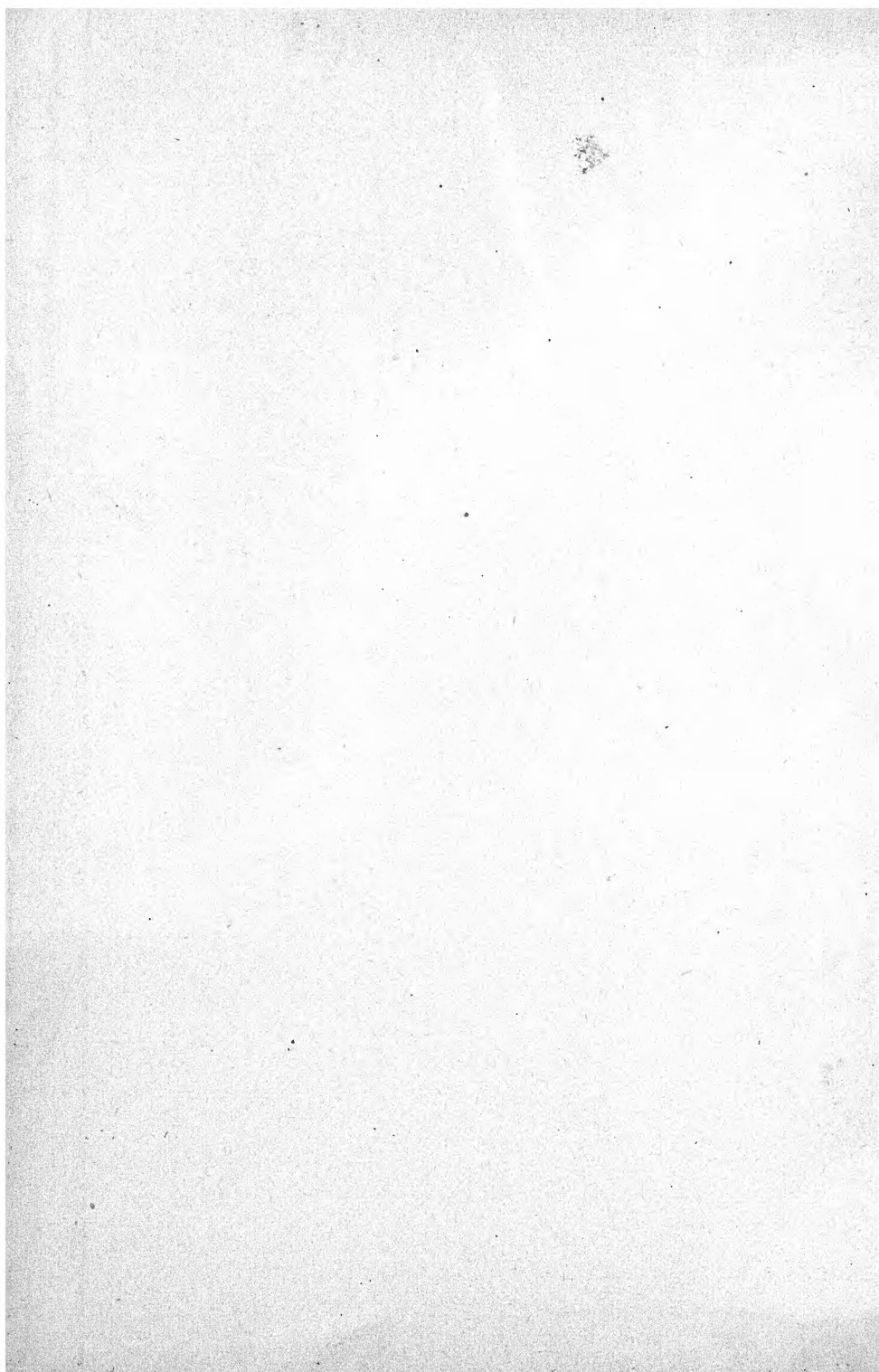


B. C.
TIMBER
FOR
PRAIRIE
FARMS





FARM BUILDING and BARN PLANS

1915

BRITISH COLUMBIA DEPARTMENT OF LANDS
FOREST SERVICE

HON. WILLIAM R. ROSS, K.C., Minister of Lands

BRITISH COLUMBIA TIMBER FOR PRAIRIE FARMS

COMBINATION OR GENERAL PURPOSE BARNs

FARM BUILDINGS SERIES
BULLETIN No. 1



THE GOVERNMENT OF
THE PROVINCE OF BRITISH COLUMBIA

VICTORIA, B. C.:

Printed by WILLIAM H. CULLIN, Printer to the King's Most Excellent Majesty
1915.

BRITISH COLUMBIA

LUMBER, SHINGLES

AND OTHER PRODUCTS OF

Douglas Fir

Western Larch

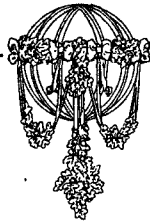
Mountain Western Pine

Western Red Cedar

Western Hemlock

Spruce

Western White Pine



LARGE SCALE WORKING PLANS FOR FARM BUILDINGS

PRICE LIST

(1.) The Forest Branch will mail post paid to Canadian post offices, for the amounts listed below, large scale blue-print working plans of the buildings, etc., shown in Bulletins 1 to 10 of the Farm Buildings Series.

(2.) In ordering, address letters to the Forest Branch, Victoria, B. C., and specify (a) name and number of building, and names of supplementary plans; (b) how many copies of each blue-print are wanted; (c) name and post office address.

(3.) Remit with order by postal note, postal money order, express order, bank draft, bank money order, or certified cheque. Stamps will not be accepted. All remittances must be made payable to the Forest Branch at par in Victoria, B. C.

(4.) Prices subject to revision.

Jan. 25th, 1916.

COMBINATION OR GENERAL PURPOSE BARN

Bulletin No. 1	Price
Description of Blue Prints	cts.
Combination Barn No. 1—Plan, cross section, north and end elevations, fresh air inlets, cupola, and ventilation system	65
Combination Barn No. 2—Plan, cross section, south and end elevations	45
Combination Barn No. 3—Perspective, plan, cross section	70
Combination Barn No. 4—Plan, long and cross sections, perspective	35
Supplementary Plans—	
Roof framing	15
Horse stall and manger	20
Cow stall and manger	15
Calf stanchions	10
Cattle mangers	20
Milk can rack	10

DAIRY BARN, ICE AND MILK HOUSES

Bulletin No. 2	
Dairy Barn No. 1—Perspective, plan, cross section	65
Dairy Barn No. 2—Perspective, plan, cross section	55
Dairy Barn No. 3—Perspective, plan, cross section	60
Dairy Barn No. 4—Perspective, plan, cross and long sections	65
Ice and Milk House No. 1—Plan, north and end elevations, long and cross sections	30
Ice and Milk House No. 2—Plan, cross section, west and end elevations	15
Supplementary Plans—	
Roof framing, cow stall and manger, cattle mangers, calf stanchions, rack for milk cans and pails: see under Bulletin No. 1 for prices.	

BEEF CATTLE BARN

Bulletin No. 3	
Beef Cattle Barn No. 1—Perspective, plan, cross section 70	
Beef Cattle Barn No. 2—Perspective, plan, cross section and manger	45
Beef Cattle Barn No. 3—Perspective, plan, cross section 85	
Beef Cattle Barn No. 4—Perspective, plan, cross section 75	
Supplementary Plans—	
Roof framing, cow stall and manger, cattle mangers, calf stanchions: see under Bulletin No. 1 for prices.	
Portable grain table	10
Portable self feeder	15

HORSE BARN

Bulletin No. 4	
Horse Barn No. 1—Perspective, plan, cross section ...	55
Horse Barn No. 2—Perspective, plan, cross section ...	70
Horse Barn No. 3—Perspective, plan, cross section, manger, hay chute	85
Horse Barn No. 4—Perspective, plan, cross section ...	90
Supplementary Plans—	
Roof framing, horse stall and manger: see under Bulletin No. 1 for prices.	

SHEEP BARN

Bulletin No. 5	
Sheep Barn No. 1—Plan, end and south elevations, cross section	30
Sheep Barn No. 2—Perspective, plan, end elevation, cross section, self feeders	35
Sheep Barn No. 3—Plan, section, west and south elevations	30
Sheep Barn No. 4—Perspective, plan, cross section ...	20
Supplementary Plans—	
Hay and grain rack No. 1, grain rack No. 2	10
Portable fence hurdles, No. 1 and No. 2	10

PIGGERIES AND SMOKE HOUSES

Bulletin No. 6	Price
Description of Blue Prints	cts.
Piggery No. 1—Plan, north, south and end elevations, cross section	30
Piggery No. 2—Plan, south elevation, 2 sections	30
Supplementary Plans for Piggeries Nos. 1 and 2—	
Alternative roof for Piggeries Nos. 1 and 2	10
Trough and swinging partition	10
Fresh air inlets and pig doors	10
Plank beds	10
Outside door and feed passage	10
Pen doors	10
Piggery No. 3—Cross section, side and end elevations, ventilator, side battens	10
Smoke House No. 1—Plan, cross section, side and end elevations	10

POULTRY HOUSES

Bulletin No. 7	
Poultry House No. 1—Plan, cross section, end and south elevations	30
Poultry House No. 2—Plan, section, side and front elevations, details roof and doors	30
Poultry House No. 3—Plan, section, side and front elevations, details roof and doors	25
Supplementary Plans—	
Trap nests	15
Feed hopper for house	10
Feed hopper for range	10
Coop for setting hen	10

IMPLEMENT SHEDS AND GRANARIES

Bulletin No. 8	
Implement Shed No. 1—Plan, front and end elevations, cross section, detail of beam	20
Implement Shed No. 2—Plan, front and end elevations, cross section	40
Granary No. 1—Plan, cross section, side and end elevations	15
Granary No. 2—Perspective, foundation and floor plans, cross and long sections	25
Granary No. 3—Perspective, plan, section	15

SILOS AND ROOT CELLARS

Bulletin No. 9	
Stave Silo No. 1—Plan, elevation, half plan of roof ...	40
Stave Silo No. 2—Plan, elevation, section, door details	40
Alternative Door for stave silos	15
Root Cellar No. 1—Plan, cross section	30

FARM HOUSES

Bulletin No. 10	
Farm House No. 1—Perspective, plan, cross section ...	35
Farm House No. 2—Perspective, basement plan, ground and second floor plans, cross section, south and east elevations	65
Farm House No. 3—Perspective, plan, cross section ...	45
Farm House No. 4—Perspective, basement and ground floor plans, section, south elevation	30
Farm House No. 5—Perspective, basement plan, ground floor and second floor plans, cross section, front and rear elevations	40
Farm House No. 6—Perspective, basement plan, ground floor and second floor and roof plans, cross section, front and rear elevations, fire-place	75
Septic Tank No. 1—Plan, section	15
Farm Layout—Plan	10

British Columbia Timber for Prairie Farms

COMBINATION OR GENERAL PURPOSE BARNs

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THE LUMBERING INDUSTRY OF BRITISH COLUMBIA

TO THE PRAIRIE FARMER.

In the forests of British Columbia there stands to-day more than half Canada's supply of commercial timber. Forest surveys made during recent years throughout the Province show 30,000,000 acres of timber ready for the market, and 45,000,000 acres of younger growth that will reach commercial size during the present century. The present merchantable stand is estimated at 400,000,000,000 feet board measure.

Taught by the experience of older countries, British Columbia has adopted a vigorous conservation policy, and is carefully protecting her vast forest areas from fire and misuse.

The manufacture of lumber and other wood products is the most important industry of this forest Province. Each year 1,500,000,000 feet of timber is cut to supply the sawmills, pulp and paper mills, and other wood-using factories west of the Canadian Rockies. But the forests produce more wood each year than the mills can find markets for, and so much timber goes to waste. The most of the timber is public property; the prosperity of the Province depends very largely upon the lumbering industry; and it is therefore the duty of the Government to help secure the widest possible market for British Columbia lumber both in foreign countries and in Canada.

The main market for Western lumber to-day is in the Prairie Provinces of Canada. Each farm is, after all, a factory for agricultural produce and needs a well-built plant like any other factory. This means good buildings—a comfortable, convenient house, good barns, granaries, silos, fences and shelter for machinery. The best material for this is wood. It is cheap, handy to use, warm, sanitary, and it lasts. British Columbia therefore desires to give the citizens of Alberta, Saskatchewan, and Manitoba full information concerning her forest products, asking them to bear in mind that these products are “grown and manufactured in Canada,” and that trade between the Provinces of the Canadian West is the surest foundation for our common prosperity.

•

The Bulletins.

Valuable bulletins on farm buildings are now being issued by agricultural authorities all over Canada and the United States. The College of Agriculture of the University of Saskatchewan was engaged in this most useful work; the Government of British Columbia entered into a co-operative agreement with the University, and the series of farm bulletins listed on the last page of this booklet is the result. The agricultural information contained herein, and the plans and bills of material were prepared under the immediate supervision of Mr. W. J. Rutherford, Dean of the College of Agriculture, and thus give up-to-date and authoritative views on the agricultural subjects dealt with. The information concerning lumber is supplied by the Forest Service of the Government of British Columbia.

In the building plans, five things are aimed at in particular:—

(1.) **That they should be specially designed to meet Prairie conditions.**

(2.) **That they should be simple and practical to meet the needs of the average farmer.**

(3.) **That ordinary stock sizes of lumber should be used throughout in order to keep the cost low.**

(4.) **That it should be easy for the farmer to make additions to the buildings whenever more accommodation should be needed.**

(5.) **That the details of the plans should be readily alterable to suit individual needs.**

The plans printed in these bulletins show enough detail for them to be used as working plans. Any one wishing to obtain large-scale working plans can secure them at cost by writing to the **Chief Forester, Victoria, B.C.** A reference list of bulletins and of sources of agricultural information will be found on the last page.

Note.

While it is understood that the agricultural authorities in Alberta and Manitoba have already published pamphlets on farm buildings, and contemplate issuing others, it is believed that all Prairie farmers will be interested in the British Columbia bulletins, and editions for general distribution on the Prairies have accordingly been printed.

UNIVERSITY OF SASKATCHEWAN.

COLLEGE OF AGRICULTURE

WALTER C. MURRAY, *President*

W. J. RUTHERFORD, *Dean*

Combination Barns for Prairie Farms

BY

A. R. GREIG, Professor of Agricultural Engineering.

A. M. SHAW, Professor of Animal Husbandry.

COMBINATION BARNs AND MIXED FARMING



IS a combination barn practical? Is it a popular type among western farmers? The answer is plain when one considers that there are more barns of the combination type than any other in use at the present time. They are practical, economical to build, lessen the labor costs in caring for stock during the winter, and in many ways appeal strongly to the average farmer.

What is meant by the average farmer, is not the man who is raising pure bred stock exclusively, not the dairyman or the rancher, but the man who owns and works a quarter or half section or three-quarter section as the case may be, grows some grain, keeps brood mares for doing his work and raising colts, raises some cattle probably of a dual purpose type, milks some of them and allows others to raise their own calves, keeps some hogs, sheep and poultry, and does the greater part of his work within the circle of his own family. He is not a specialist. He is not engaged in one line of endeavor exclusively, but combines many lines and by so doing has a regular income derived from various sources. He practises mixed farming.

Farmers of this type are almost invariably successful. As a rule they own their farms, have them well fenced, well equipped with modern buildings and are in easy circumstances generally.

Where they locate in large numbers we find a prosperous community, a settlement of homes, vastly different from the appearance of the districts where the bonanza farm and the one crop method of farming is in vogue. In fact the most permanently prosperous districts of all agricultural countries are those in which the majority of the farmers are engaged in mixed farming.

While the practice of mixed farming is strongly advocated for western farmers, a very large percentage of whom are at present bending their energies almost exclusively to the growing of grain, a word of caution may not be out of place here. Men are sometimes carried away by reading or hearing glowing accounts of the success of the mixed farmer, and allow themselves to be stampeded into making a sudden change from their regular farm practice of growing grain to the handling of live stock. This is a mistake. The men referred to attained their success gradually by long continued effort and perseverance. They, for the most part, started in a small way and gained the necessary experience as their business grew. So must it be with the Prairie farmer, many of whom are totally inexperienced in the proper methods for the successful handling of farm animals. A small beginning should be made and some experience gained before too much capital be invested in the enterprise.

Many parts of the Canadian West are now passing through a sort of transition period. The days of the shack and sod stable are gone. Live stock is on the increase and with it comes the need for barns. However, this does not necessarily mean a large outlay at the beginning. A common idea seems to prevail that to engage in live stock work requires first of all the erection of a complete set of separate farm buildings suited to the requirements of each particular class of animal kept. Although many good reasons could be given to show that this is desirable, it is also expensive and is by no means essential. Many of the now famous herds had their origin among very humble surroundings. In fact the writer is familiar with many prize winning animals, among them several grand champions, that were bred and raised to maturity in very ordinary general purpose or combination barns, which also sheltered all of the other farm animals.

The great objection to separate buildings, from the standpoint of the beginner, is the cost. He cannot afford to put up separate

buildings for only a very few animals of each class. He may later on turn his attention to special lines of work and, as he is able, build separate dairy barns and horse barns and beef cattle barns, but at the start he will have to be content with only one barn in which to house all his stock, and it may relieve him somewhat to hear that the arrangement is perfectly satisfactory where proper partitions are provided and cleanliness observed.

The ordinary practice is to keep only horses and cattle in the same building, but if other accommodation is inadequate, a first class farrowing pen for a brood sow can be made out of a double horse stall. If the pen is kept clean no bad results will follow either to the sow or to the horses. A box stall may be requisitioned on occasion in which to house a few ewes with early lambs during severe or inclement weather.

BARN ESSENTIALS

In building a barn there are several points that should receive consideration:

1. The site should be high, well drained, and convenient in relation to the other buildings. (See Bulletin No. 10 on Farm Houses for grouping of buildings.)
2. The barn must be both warm and dry.
3. It must be well ventilated. This is particularly important where severe weather makes the opening of windows and doors for ventilation impracticable.
4. It must be well lighted with plenty of windows. A dark barn is invariably dirty and unsanitary.
5. It must be strongly built. The walls should be well braced to withstand high winds.
6. The interior must be arranged so as to provide (a) the most comfortable quarters for the various animals; (b) the minimum of labor in caring for the stock. These two conditions call for most careful planning in a barn which shelters horses, cows and young stock, with probably a couple of sows and a few ewes. Stalls and box stalls should receive the same careful attention as to their size, mangers and floors, as would be the case in a separate barn used exclusively for one kind of animal. Feeding arrangements should be well thought out; the bins for oats, meal and chop

centrally located; hay and straw chutes from the loft placed in the most convenient locations for speedy handling of the feed or bedding; doors of a size and in such positions as will allow of a herd of say a dozen cows being admitted or let out quickly. These matters may not appear very important before the barn is built, but they will assuredly matter a great deal in the efficient working of the barn when filled with stock. For example, stall platforms two inches too long mean dirty cows; a few additional and unnecessary steps twice a day mean a good many miles a year. A well planned, conveniently fitted barn does not necessarily cost one cent more to build than one built without such careful attention to details, while it is much more comfortable for the animals and convenient for the attendant.

In putting up the barn, it is well to make a point of completely finishing the work in all its details down to the last harness peg before laying off the men engaged to build. Do not leave little things to be fixed at odd times or on wet days, for they never will be fixed.

The barns described in the following pages are entirely suitable for western conditions, can be economically constructed and will prove practical in every way.

Combination Barn No. 1.

This is a barn 28 feet by 36 feet, with a lean-to 14 feet wide. It will accommodate comfortably twelve horses and eight cows (See Fig. 1).

The horses stand in double and box stalls and are fed through chutes leading from the loft to the mangers. (See Fig. 17.) A combined harness and feed room is provided in which also is located a stairway to the loft. The cattle are stabled in the lean-to, and the feed for them is delivered to their feed passage by two chutes built on an angle to the loft floor (shown by the dotted lines in both the plan, Fig. 1, and section, Fig. 2). These feed chutes, like the horse manger hay chutes, should all have tight fitting doors in the loft, and the doors should be kept closed when not in use. A detail of the cow stalls is shown in Figs. 18 and 19.

At one end is a roomy box stall for the young calves. A detail of the calf stanchions is shown in Fig. 20. The sliding bar device

makes it easy to lock all the calves in the stanchions at once, though some object to it on account of having to wait until the last calf is in place before they can be locked in.

A driveway through the horse stable makes it easy to clean the manure out and to take it directly to the fields. Nothing has been specified for the floors of the litter alleys. If the builder can afford

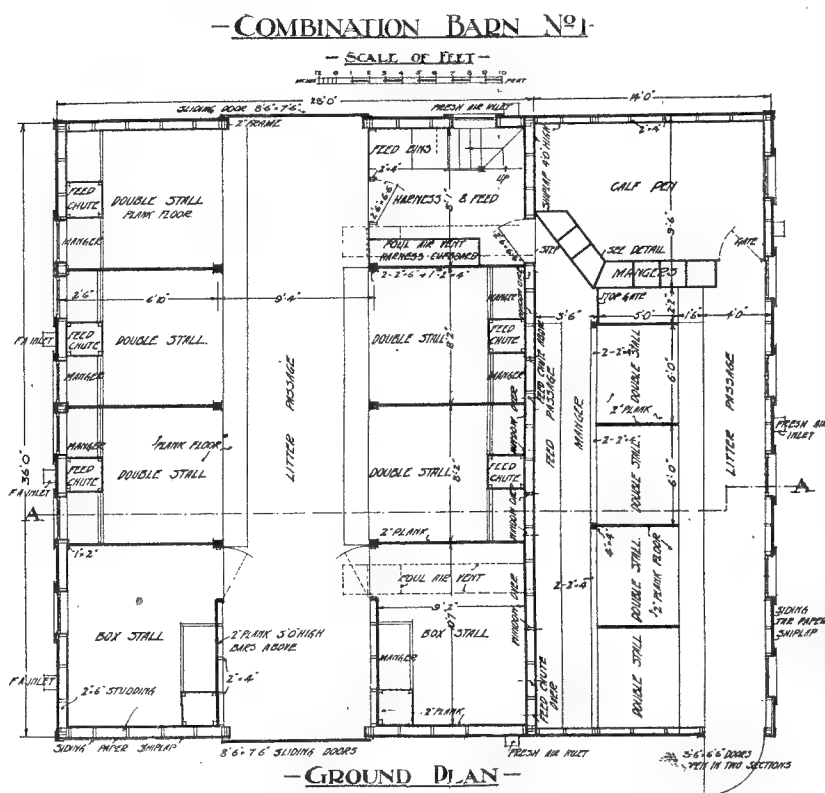
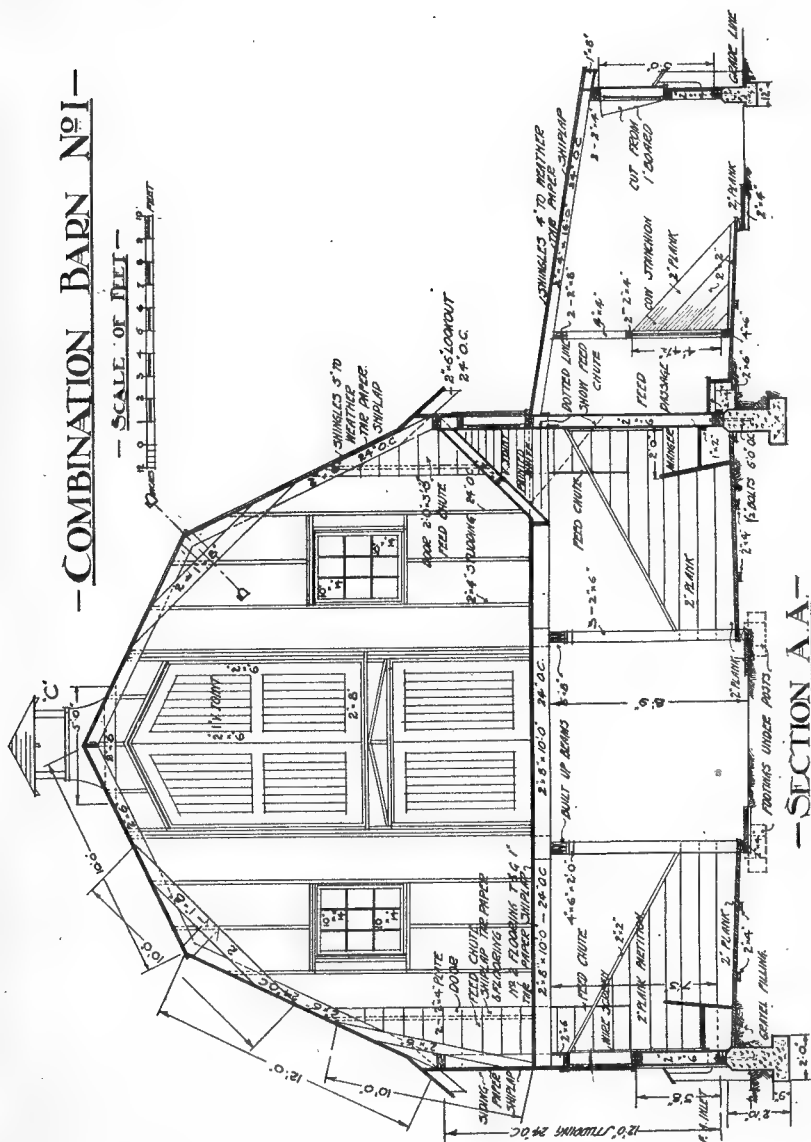


Fig. 1. An economical general purpose barn for the average farm.

it concrete should be used; or if it is not put in at first, provision should be made for laying it in the future.

An objection to this type of barn as ordinarily built is that the lean-to tends to shut the light out of the main stable. This has been partially overcome in this case by placing windows above the roof

COMBINATION BARN NO 1



The ventilation of the lean-to is shown in Fig. 7. Details of the fresh air inlet are shown in Fig. 5, and of the outlet or cupola in Fig. 6.



The foundation is shown as 2 feet 10 inches deep, but this may be modified to suit the conditions of the ground. There is no necessity to go deeper than to reach good firm soil. The trench for the foundation should be 24 inches wide. The forms for the 12-inch concrete wall on top of the footing should be built with spacing block wired in between the sides to keep them just 12 inches apart, and should be supported from the surface of the ground so that the

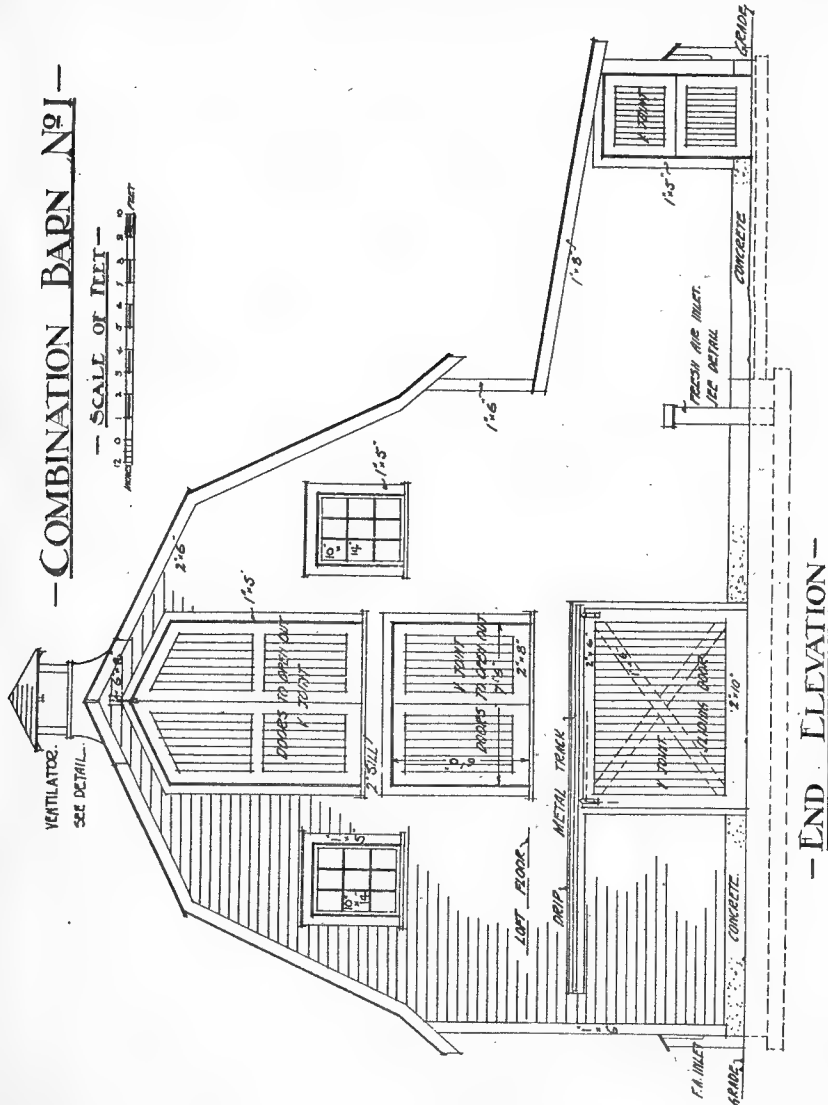


Fig. 4. A manure-spreader or wagon can be driven through the sliding doors of the litter alley in the horse barn.

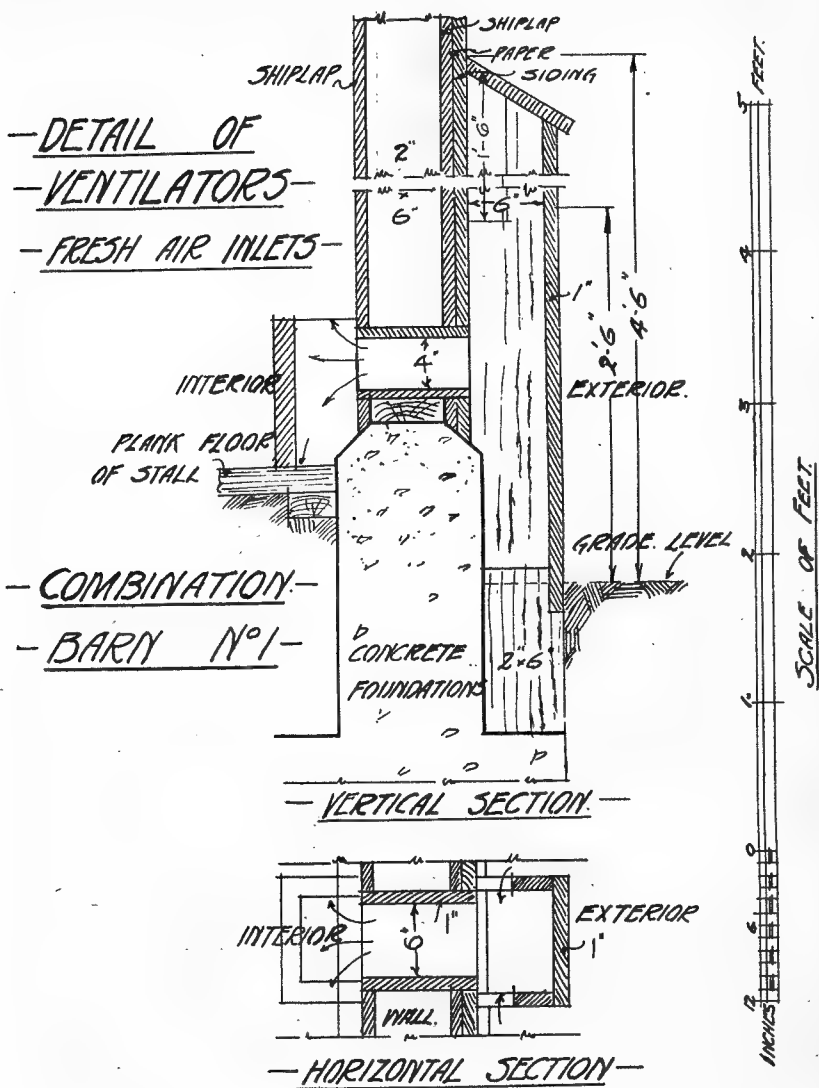


Fig. 5. Fresh air evenly distributed is necessary for the health of the stock.

bottom of the forms is 9 inches above the bottom of the trench. The footings and walls can then all be filled with concrete at the same

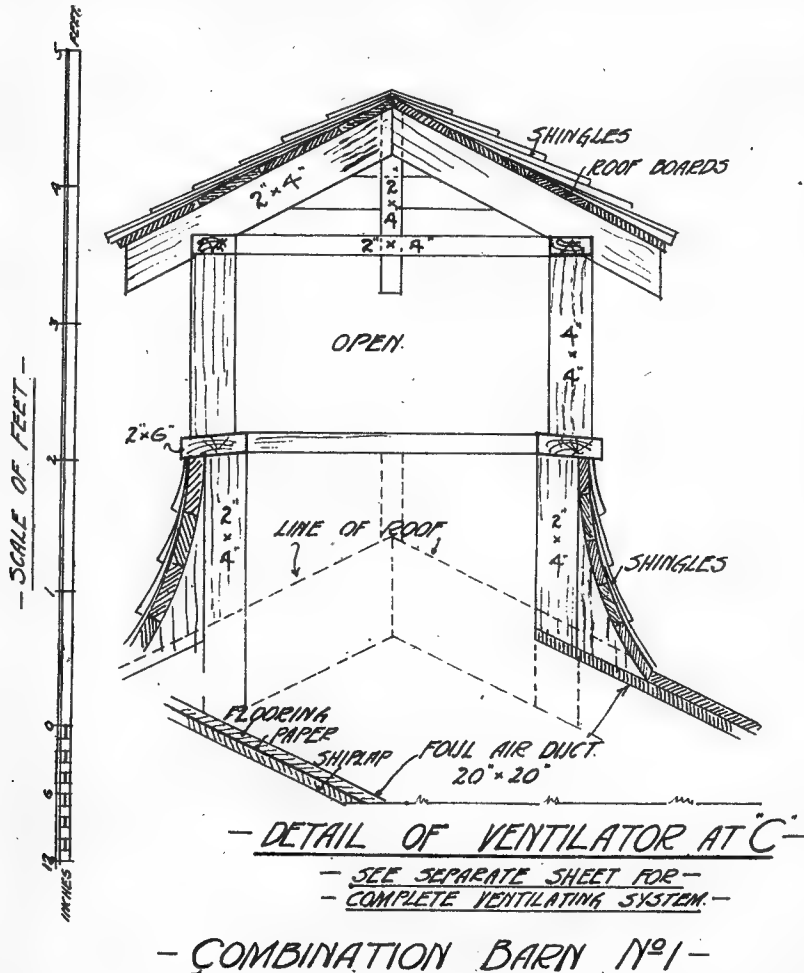


Fig. 6. It is preferable to have the sides of the cupola entirely open rather than covered with slats.

time. Anchor bolts $\frac{5}{8}$ inch by 8 inches, hung from the top of the forms to project $2\frac{1}{2}$ inches above the concrete, should be placed every 5 or 6 feet along the foundation.

The posts supporting the beams are made of two pieces of 2 x 6 spaced 2 inches apart to allow the planks forming the stall divisions to be inserted between them. They should be fastened together with bolts. Spacing blocks should be bolted in at intervals above the plank divisions to prevent buckling.

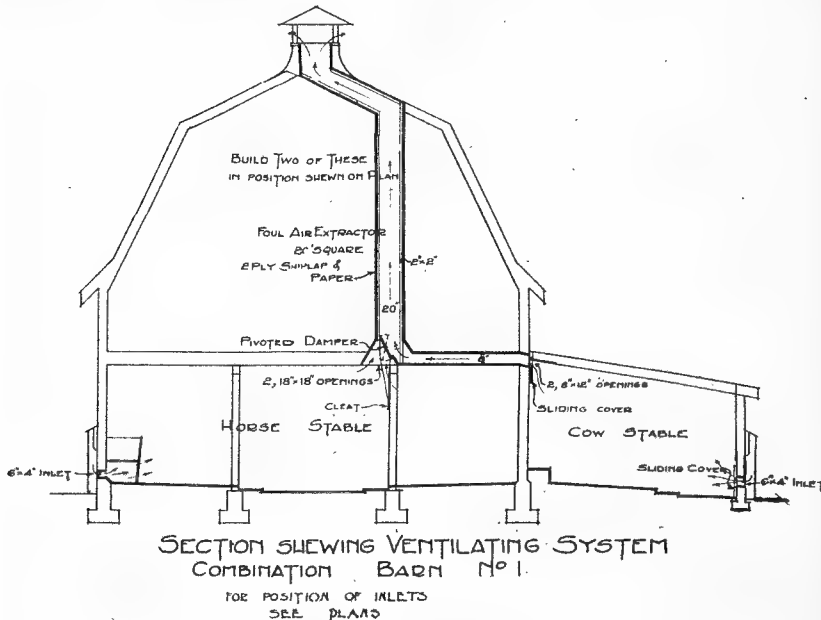


Fig. 7. The foul air shafts should be constructed of two thicknesses of boarding with tar paper between.

The plans and bills of materials taken together will show how the building is framed, and the sizes of materials required. The roof framing is shown in Fig. 16. In all cases before cutting to sizes in the bill, measurements should be taken off the building as it is erected. In a good many cases the lengths are given to the next longer even foot.

Bill of Materials, Combination Barn No. 1.

Framing Lumber

No. of Pcs.	Inches Thick	Inches Wide	Feet Long	Feet, Board Measure	USED FOR
2	6	8	10	80	Hay fork beams at ends of barn.
2	4	6	12	48	Cattle manger backs.
6	4	6	2	24	Corbels.
16	2	12	18	576	Horse stall partitions.
1	2	12	10	20	
5	2	12	18	180	Horse stall gutters.
15	2	12	8	240	Horse manger fronts.
10	2	12	8	160	Box stall front partitions.
8	2	12	6	96	Box stall mangers.
30	2	10	18	900	Floor to horse stalls and feed room.
4	2	10	14	93	Cattle stall divisions.
4	2	10	14	93	Cattle stall gutters.
6	2	10	10	100	Cattle manger front.
5	2	10	8	67	Horse manger bottom.
1	2	10	8	13	Floor to cattle stalls.
16	2	10	14	374	Floor to cattle stalls.
2	2	10	12	40	Stair strings.
2	2	10	6	20	Box stall manger bottoms.
1	4	4	10	13	Newel posts.
1	4	4	14	19	Lean-to posts.
2	4	4	14	37	Cupola posts, to cut 8 pieces 3' 6".
3	2	8	16	64	Rafter braces.
3	2	8	16	64	Ridge pole.
2	2	8	16	43	Trimmer between joists, sloping to floor.
1	2	8	8	11	Rafter brace.
5	2	8	8	53	Horse manger bottom.
4	2	8	14	75	Beams, lean-to.
2	2	8	12	32	Beams, lean-to.
2	2	8	6	16	Box stall manger bottoms.
57	2	8	10	760	Joists.
24	2	8	10	320	Beams, main barn.
3	2	8	10	40	Feed passage floor, to lean-to.
*12	2	6	16	260	Sills and plates.
*4	2	6	14		
*1	2	6	12		
19	2	6	16	304	Studs, end walls.
21	2	6	16	336	Rafters, lean-to.
12	2	6	8	96	Posts, horse barn.
1	2	6	8	8	Stud, end wall.
4	2	6	8	32	Locking bar to doors.
16	2	6	14	224	Studs, end wall.
2	2	6	14	28	Cupola stool.
2	2	6	14	28	Mud sills to feed alley, lean-to.
52	2	6	12	624	Studs, side walls.
Carried forward				6,611	

Framing Lumber—Continued

No. of Pcs.	Inches Thick	Inches Wide	Feet Long	Feet, Board Measure	USED FOR
Brought forward ... 6,611					
11	2	6	12	132	Studs, end walls.
3	2	6	12	36	Window trim.
6	2	6	12	72	Joist ribbon.
42	2	6	12	504	Rafters.
3	2	6	12	36	Ribbon to lean-to.
3	2	6	12	36	Mud sills, feed alley to lean-to.
20	2	6	6	120	Collar ties.
21	2	6	6	126	Lookouts, to cut 42 pieces.
42	2	6	10	420	Rafters.
17	2	6	10	170	Studs, end walls.
6	2	6	10	60	Mud sills, horse stall floor.
20	2	6	10	200	Rafter braces.
8	2	6	10	80	Corner braces to loft.
*10	2	4	14	93	Sills and plates, lean-to.
2	2	4	16	21	Rafters, cupola.
3	2	4	16	32	Studs, end wall to lean-to.
2	2	4	16	21	Mud sills, horse barn gutters.
2	2	4	8	11	Sills, box stall partitions.
8	2	4	8	43	Bars, box stall front partitions.
4	2	4	14	37	Mud sills, cattle stall floor.
2	2	4	14	19	Mud sills, feed alley, lean-to.
2	2	4	14	19	Cupola rafters.
6	2	4	14	56	Mud sills, horse stall floor.
3	2	4	14	28	Studs, end wall, lean-to.
1	2	4	14	9	Horse manger supports.
10	2	4	14	99	Joists, sloping to loft floor.
1	2	4	8		
6	2	4	12	48	Mud sills, horse stall floor.
4	2	4	12	32	Cattle manger, top bar.
2	2	4	12	16	Cupola plate.
2	2	4	12	16	Mud sills, horse stall gutter.
3	2	4	6	12	Window framing.
2	2	4	6	8	Cupola studs.
3	2	4	6	12	Studs, end wall, lean-to.
3	2	4	10	20	Support for sills, feed alley, lean-to.
8	2	4	10	53	Studs, end wall, lean-to.
18	2	4	10	120	Partitions, box stalls and feed room.
1	2	4	10	7	Mud sills, horse and cattle gutters.
4	2	4	10	27	Ridge pole brace.
13	2	4	10	87	Studs, lean-to.
4	2	4	10	27	Cattle stall posts.
3	2	4	18	36	Horse manger supports.
2	2	4	2	3	Corbels, lean-to.
*12	2	2	16	64	Joist bridging.
* 2	2	2	12	8	Joist bridging.
Carried forward 9,687					

Framing Lumber—Continued

No. of Pcs.	Inches Thick	Inches Wide	Feet Long	Feet. Board Measure	USED FOR
Brought forward ... 9,687					
16	2	2	12	64	Ventilator frame.
28	2	2	10	93	Feed chute frame.
3	2	2	10	10	Caps, horse stall divisions.
2	2	2	10	7	Caps, cattle stall divisions.
4	2	2	10	13	Stop at floor, stall divisions.
10	1	8	10	67	Rafter braces.
80	1	8	8	427	Rafter braces.
4	1	4	10	13	Battens, cattle stall divisions.
6	1	2	14	14	Stops, horse stall divisions.
Total, Framing Lbr. 10,395					

*Random lengths to make up the same total number of lineal feet will answer for these items.

Finish Lumber

1	2	10	18	30	Bottom rails, sliding doors, rabbeted $\frac{3}{4}$ ".
1	2	10	6	10	To cut 2 bottom rails to box stall door.
2	2	9	10	30	Frame header, sliding doors, rabbeted $\frac{3}{4}$ ".
4	2	9	8	48	Frame jambs, sliding doors, rabbeted $\frac{3}{4}$ ".
2	2	8	10	27	Frame headers, hay fork door, rabbeted 2".
2	2	8	18	48	Frame jambs, hay fork door, rabbeted 2".
2	2	8	18	48	Sills, loft doors, to cut 8' 6".
2	2	8	8	21	Frame headers, lower loft door.
4	2	8	8	43	Bottom rails, loft doors, to cut 3' 9", rabbeted $\frac{3}{4}$ ".
1	2	8	4	5	Bottom rails, lean-to, to cut 3' 6", rabbeted $\frac{3}{4}$ ".
2	2	8	12	32	Frame jambs, lower loft door.
1	2	7	14	16	Frame jambs, lean-to door.
1	2	7	4	5	Frame header, lean-to door.
2	2	6	6	12	Top and centre rails to box-stall door.
4	2	6	10	40	Middle stiles, hay fork doors, rabbeted $\frac{3}{4}$ ".
2	2	6	18	36	Side stiles, hay fork door, rabbeted $\frac{3}{4}$ ".
1	2	6	18	18	Top rail, sliding doors, rabbeted $\frac{3}{4}$ ".
4	2	6	8	32	Stiles, sliding doors, rabbeted $\frac{3}{4}$ ".
8	2	6	6	48	Stiles, lower loft door, rabbeted $\frac{3}{4}$ ".
4	2	6	4	16	Top rails, hay fork doors, rabbeted $\frac{3}{4}$ ".
4	2	6	4	16	Middle rails, hay fork doors, to cut 3' 9", rabbeted $\frac{3}{4}$ ".
Carried forward 581					

Finish Lumber—Continued

No. of Pcs.	Inches Thick	Inches Wide	Feet Long	Feet, Board Measure	USED FOR
Brought forward				581	
4	2	6	4	16	Top rails, lower loft door, to cut 3' 9", rabbeted $\frac{3}{4}$ ".
1	2	6	10	10	Lean-to doors, to cut 3 pieces 3' 6" for rails, and 4 pieces 3' 3" for stiles, rabbeted $\frac{3}{4}$ ".
1	2	6	14	14	
4	2	6	6	24	Stiles to box-stall door.
1	1	12	8	8	Tops, fresh air inlets, to cut 1' 0".
1	1	10	14	12	Fronts to fresh air inlets, to cut 3' 6".
1	1	10	12	10	Fronts to fresh air inlets, to cut 3' 6".
9	1	10	12	90	Frieze, side wall.
2	1	8	16	21	Soffit, lean-to.
2	1	8	16	21	Fascia, lean-to.
1	1	8	14	9	Soffit, lean-to.
1	1	8	14	9	Fascia, lean-to.
2	1	8	14	19	Frieze.
4	1	8	12	32	Frieze, end walls barn.
2	1	8	12	16	Soffit, lean-to.
2	1	8	12	16	Fascia, lean-to.
4	1	8	10	27	Frieze, end walls barn.
2	1	6	14	14	Corner boards.
1	1	6	14	7	Ridge board.
3	1	6	14	21	Sides, fresh air inlets, to cut 3' 6".
1	1	6	8	4	Sides, fresh air inlet, to cut 3' 6".
2	1	6	12	12	Ridge boards.
4	1	6	10	20	Braces to sliding doors.
2	1	6	12	12	Corner boards.
2	1	5	14	12	Corner boards.
1	1	5	14	6	Ridge board.
1	1	5	14	6	Side casing, door to lean-to.
2	1	5	12	10	Corner boards.
2	1	5	12	10	Ridge.
8	1	5	10	33	Door casing.
6	1	5	8	20	Door casing.
4	1	5	6	10	Door casing.
1	1	5	6	2	Door casing.
14	1	2	4	9	Battens, fresh air inlets.
Total, Finish Lumber 1,143					

10,000 feet, board measure, shiplap.

2,500 feet, board measure, siding.

1,500 feet, board measure, 1" flooring.

500 feet, board measure, V-joint.

23,500 British Columbia Red Cedar shingles, edge grain (94 bundles).

18 sashes, 4 light, 12" x 14"; outside size 2' 4½" wide x 2' 9" high.

12 sash frames, sills and casings, for 9" wall.

6 sash frames, sills and casings, for 7" wall.

- 4 sashes, 9 light, 10" x 14"; outside size 2' 10½" wide x 3' 11" high.
- 4 sash frames, sills and casings, for 8" wall.
- 2 doors, 2' 6" x 6' 6", for feed room.
- 1 door frame, sill and casing, for 8" wall.
- 1 door frame, sill and casing, for 6" wall.

Hardware

- 200 lbs. 4" common nails, for framing.
- 200 lbs. 2½" common nails, for shiplap.
- 110 lbs. 2¼" flooring nails, for siding, flooring and V-joint.
- 25 lbs. finishing nails, for trim.
- 115 lbs. 1¼" galvanized, zinc-clad or zinc shingle nails.
- 2 lengths single door track, 18' each.
- 6 door hangers for 3" door.
- 10 pairs 12" T hinges, for loft doors.
- 13 pairs 6" T hinges, for small doors and gates.
- 14 pairs 6" strap hinges, for feed chute doors.
- 12 pairs 5" T hinges, for windows.
- 12 window catches.
- 5 barn door latches.
- 5 hooks and eyes, 6", for sliding and lean-to-doors.
- 18 hooks and eyes, 3", for alley, cupboard and feed chute doors.
- 8 cow ties.
- 8 iron brackets, for door locking bars.
- 4 bolts, ⅝" x 6", for door bars.
- 43 bolts, ⅝" x 8", with nuts and double washers, for foundation.
- 7 bolts, ⅜" x 2", for calf stanchions bar.
- 7 bolts, ⅜" x 6", for calf stanchions bottom.
- 10 pieces ⅝" x 24" round iron rods, for box stall doors.
- 1 sliding iron bar, ⅜" x 1¼" x 10', for calf stanchions.
- 1 sliding iron bar, ⅜" x 1¼" x 6', for calf stanchions.
- 2 rods, ⅝" x 30", for ventilator damper pivot.
- 18 rolls tar paper.
- 20 yards of gravel.
- 108 bags of cement.

Combination Barn No. 2.

Combination Barn No. 2 is 34 feet by 50 feet, and provides stabling for eleven horses and fifteen cows (see Fig. 8.)

The double horse stalls are of such a width that they can be divided if desired into single stalls. Four single stalls are shown; also a box stall 9 feet 8 inches by 12 feet, suitable for a driver, for a mare and foal, or for a freshening cow. The mangers are equipped with hay chutes from the loft, one chute for each double stall, located in the centre with an opening on each side. A plan of the manger and chute is shown in detail in Fig. 17.

The cows are divided off from the horses by a tight partition in which is placed a roller door across the litter alley. They stand in double stalls in two rows across the barn. Although they have

ample room in the stalls themselves, feeding is somewhat inconvenient because the feed must be taken up between the cows. One row of stall platforms is only 4 feet 10 inches in length, while the

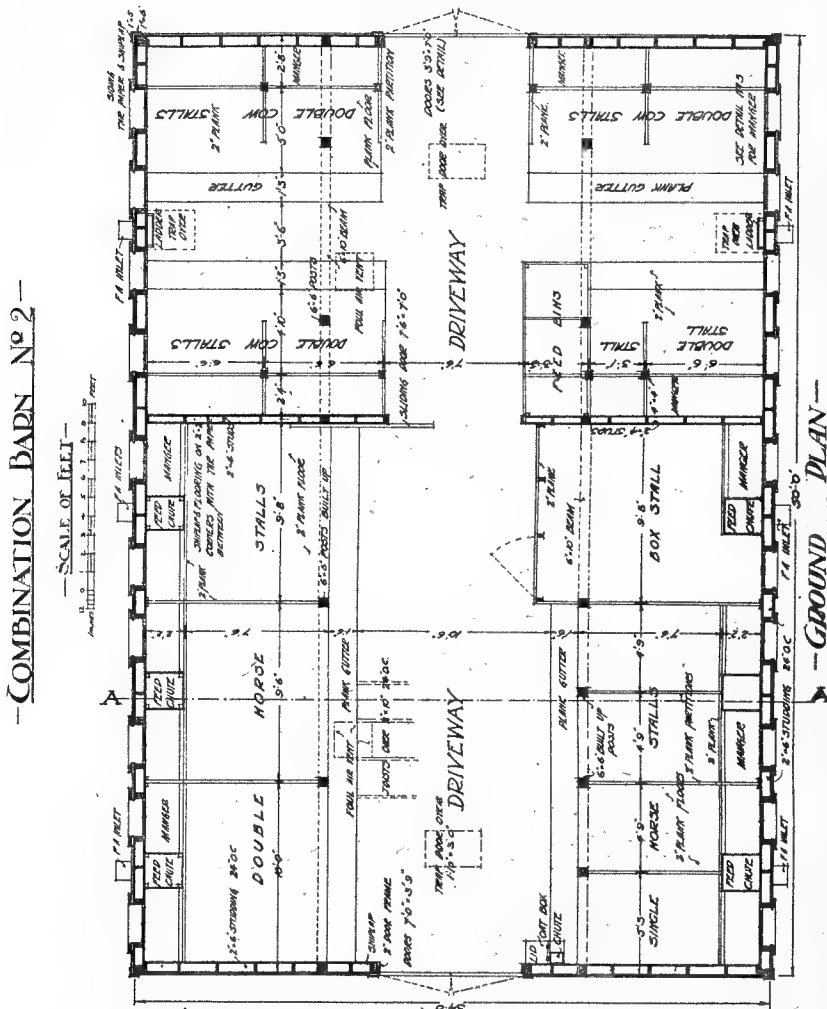


Fig. 8. This is primarily a horse barn and when desired horse stalls can easily be substituted for the cow stalls.

other is 5 feet, the shorter ones being intended for heifers and small cows. The space of a single stall on the inside next the litter alley has been used for feed bins. If the meal were kept in an adjacent or nearby building this space could be utilized for another cow.

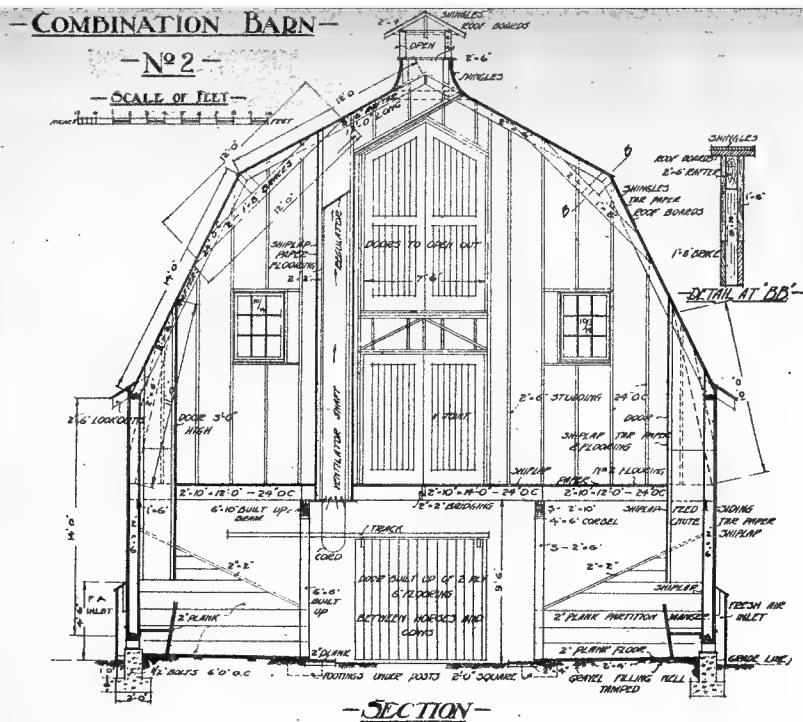


Fig. 9. There are no posts in the hay loft to interfere with storage of feed.

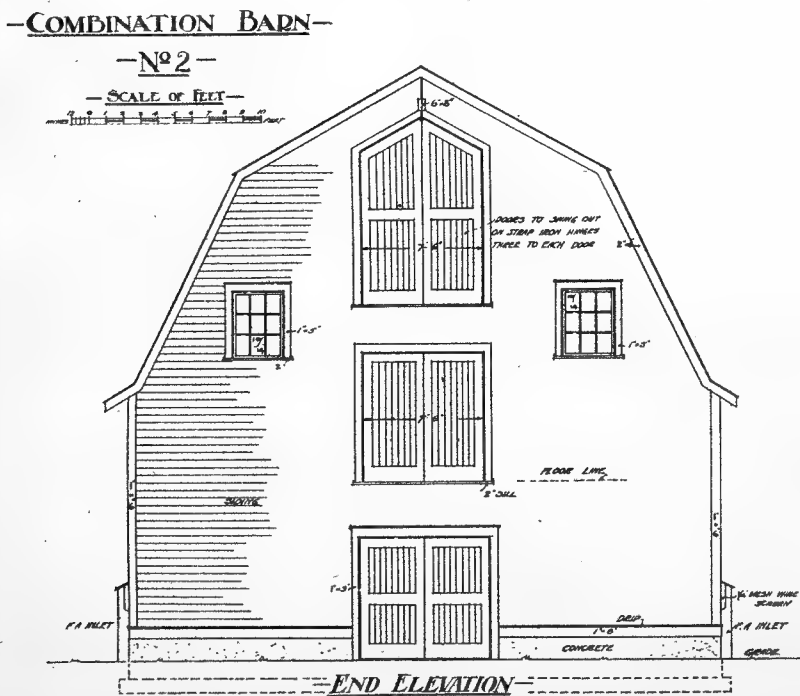


Fig. 11. These barns are strongly braced inside, and will withstand any wind.

The wide driveway makes the barn convenient to clean, as a wagon or spreader can be driven clear through.

The point to keep in mind in erecting a building of this kind is

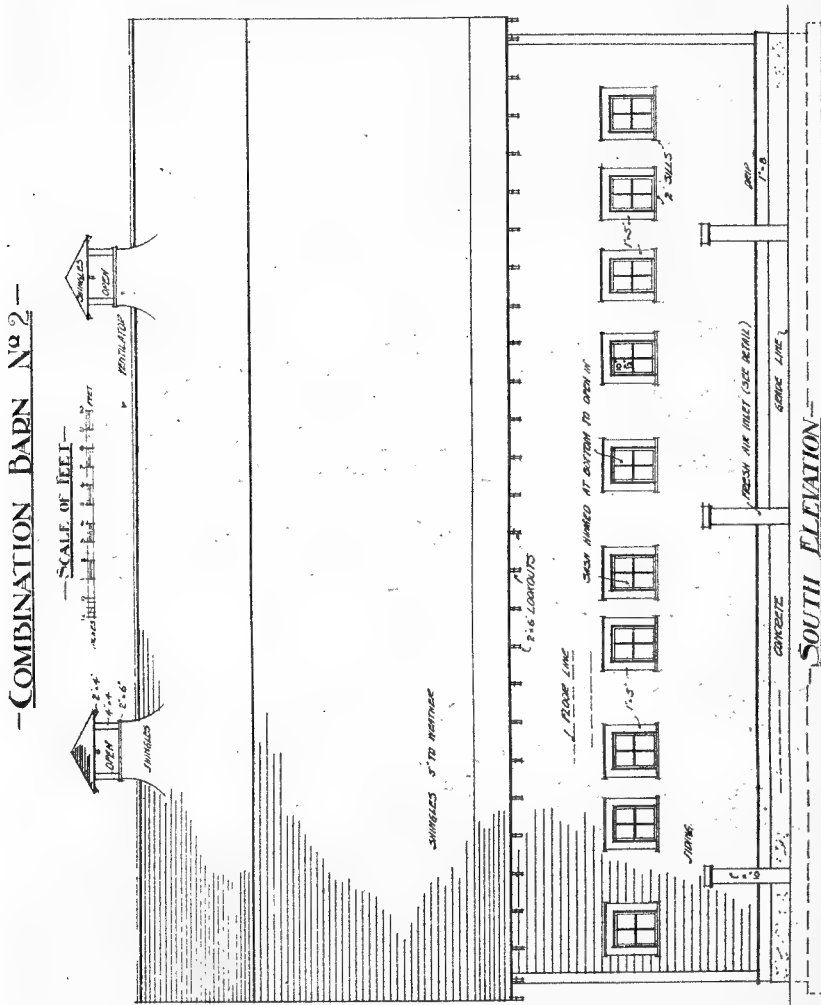


Fig. 10. Plenty of fresh air and sunlight provided for.

that it is designed primarily for a horse stable and is intended to be used only temporarily as a combination barn. By taking out the cow stalls and replacing them with horse stalls, accommodation could be secured for twenty horses.

Bill of Materials, Combination Barn No. 2.

Framing Lumber

No. of Pcs.	Inches Thick	Inches Wide	Feet Long	Feet, Board Measure	USED FOR
2	6	8	10	80	Hay fork beam.
2	4	6	12	48	Corbels, to cut 12 pieces 2' 0".
8	4	4	10	107	Posts for cattle stalls.
4	4	4	8	43	Cupola posts, to cut 8 pieces 4' 0".
9	2	12	12	216	Box stall walls.
20	2	12	10	400	Horse stall divisions.
15	2	12	10	300	Horse mangers.
10	2	12	8	160	Horse stall divisions.
4	2	12	6	48	Stall divisions.
2	2	10	16	53	Cow manger divisions, to cut 16 pieces 2' 0".
26	2	10	14	607	Joists.
8	2	10	14	187	Gutter to cattle stalls.
1	2	10	14	23	Ends to feed bins, to cut 3' 6".
52	2	10	12	1,040	Joists.
6	2	10	12	120	Beams.
1	2	10	12	20	Box stall manger bottoms, to cut 2 pieces 6' 0".
24	2	10	10	400	Beams.
1	2	10	10	17	Cow manger divisions, to cut 5 pieces 2' 0".
10	2	10	10	167	Gutter, horse stalls.
10	2	10	10	167	Horse manger bottoms.
14	2	10	10	233	Cow stall divisions.
8	2	10	8	107	Feed bin.
3	2	8	14	56	Cow manger fronts.
4	2	8	14	75	Ridge pole.
1	2	8	14	19	Cow manger divisions, to cut 7 pieces 2' 0".
7	2	8	12	112	Roof struts, to cut 56 pieces 1' 6".
1	2	8	10	13	Cow manger fronts.
*21	2	6	16	336	Sills and plates.
* 5	2	6	16	80	Ribbon under joists.
50	2	6	16	800	Studs, end walls.
* 1	2	6	14	14	Sills and plates.
14	2	6	14	196	Studs, end walls.
64	2	6	14	896	Studs, side walls.
56	2	6	14	784	Rafters.
2	2	6	14	28	Cupola stool.
8	2	6	12	96	Corner braces to hay loft.
8	2	6	12	96	Framing, windows.
56	2	6	12	672	Rafters.
7	2	6	12	84	Studs, end walls.
28	2	6	12	336	Collar ties, to cut 56 pieces 6' 0".
Carried forward				9,236	

Framing Lumber—Continued

No. of Pcs.	Inches Thick	Inches Wide	Feet Long	Feet, Board Measure	USED FOR
Brought forward ...				9,236	
* 2	2	6	10	20	Ribbon under joists.
8	2	6	10	80	Collar ties, to cut 16 pieces.
54	2	6	10	540	Braces, rafters.
14	2	6	10	140	Lookout rafters, to cut 2' 6".
4	2	6	8	32	Door locking bars.
24	2	6	8	192	Posts under floor beams.
1	2	4	18	12	Corbels.
*15	2	4	16	160	Mud sills, floor, horse stalls and gutters.
2	2	4	16	21	Cupola rafters.
* 1	2	4	14	9	Mud sills, floor, horse stalls and gutters.
2	2	4	14	19	Cupola rafters.
2	2	4	14	19	Cupola plate.
12	2	4	14	112	Mud sills, floor, cattle stalls.
4	2	4	14	37	Partition sills and plates.
4	2	4	14	37	Corner wall studs.
4	2	4	14	37	Ladder strings.
3	2	4	14	28	Top rail, cattle mangers.
1	2	4	12	8	Cupola studs.
26	2	4	10	173	Partition studs.
1	2	4	10	7	Box stall plate.
1	2	4	10	7	Cattle manger top rail.
7	2	4	10	47	Cattle manger slats, to cut 14 pieces 5' 0".
6	2	4	10	40	Horse manger supports.
1	2	4	5	3	Box stall sill.
*18	2	2	16	96	Joist bridging.
* 1	2	2	16	5	Ventilator frame.
1	2	2	16	5	Feed bin stops.
24	2	2	16	128	Framing, feed chutes.
* 1	2	2	12	4	Joist bridging.
*17	2	2	12	68	Ventilator frame.
3	2	2	12	12	Horse stall division caps.
2	2	2	10	7	Horse stall division caps.
2	2	2	10	7	Floor cleats, cow stall divisions, to cut 11 pieces 1' 8".
2	1	10	14	23	Feed bin divisions, to cut 8 pieces 3' 6".
108	1	8	12	864	Rafter braces.
14	1	8	12	112	Rafter cleats, to cut 112 pieces 1' 6".
7	1	4	10	23	Cattle manger slats, to cut 14 pieces 5' 0".
4	1	2	14	9	Ladder rungs, to cut 28 pieces 2' 0".
2	1	2	12	4	Stops, feed bins.
1	1	2	10	2	Stops, cattle manger divisions, to cut 14 pieces 8".
6	1	2	8	8	Fresh air inlet battens.
7	1	2	8	9	Stops, cattle manger divisions.
Total				12,402	

*Random lengths to make up the same total number of lineal feet will answer for these items.

Finish Lumber

No. of Pcs.	Inches Thick	Inches Wide	Feet Long	Feet, Board Measure	USED FOR
12	2	10	4	80	Lower rails, end doors, rabbeted $\frac{3}{4}$ ".
1	2	10	3	5	Lower rails, box stall door, rabbeted $\frac{3}{4}$ ".
6	2	9	8	72	Frame, lower door, rabbeted 2".
4	2	8	10	53	Frame, top door, rabbeted 2".
6	2	8	8	64	Frame, middle door, rabbeted 2".
2	2	8	10	27	Frame, top door, rabbeted 2".
4	2	6	12	48	Stiles, hay fork door, rabbeted $\frac{3}{4}$ ".
4	2	6	10	40	Stiles, hay fork door, rabbeted $\frac{3}{4}$ ".
16	2	6	8	128	Stiles, lower and centre doors, rabbeted $\frac{3}{4}$ ".
2	2	6	6	12	Stiles, box stall door, rabbeted $\frac{3}{4}$ ".
2	2	6	10	20	Top rails, hay fork doors, rabbeted $\frac{3}{4}$ ".
16	2	6	4	64	Top and middle rails, end doors, rabbeted $\frac{3}{4}$ ".
1	2	6	6	6	Top and middle rails, box stall door, rabbeted $\frac{3}{4}$ ".
1	1	12	6	6	Fresh air inlet tops.
4	1	10	14	47	Frieze, sides.
4	1	10	12	40	Frieze, sides.
6	1	10	4	20	Fresh air inlet fronts.
4	1	8	16	43	Frieze, ends.
4	1	8	12	32	Frieze, ends.
4	1	6	14	28	Corner boards.
4	1	6	14	28	Ridge boards.
12	1	6	4	24	Fresh air inlet sides.
4	1	5	14	23	Corner boards.
4	1	5	14	23	Ridge boards.
8	1	5	10	33	Door casing.
2	1	5	10	8	Door casing.
8	1	5	8	27	Door casing.
Total				1,001	

15,000 feet, board measure, shiplap.

3,700 feet, board measure, siding.

2,200 feet, board measure, 1" flooring.

1,000 feet, board measure, 2" plank floor for horse stalls, in 10' lengths.

800 feet, board measure, 2" plank floor for cow stalls, in 10' lengths.

600 feet, board measure, 1" V-joint.

28,000 shingles, B.C. Red Cedar, edge grain (112 bundles).

20 sashes, 4 lights, 10" x 12"; outside size 2' 0 $\frac{1}{2}$ " wide x 2' x 4 $\frac{1}{2}$ " high.

20 sash frames, sills and casings, for 9" wall.

4 sash, 9 lights, 10" x 14"; outside size 2' 10 $\frac{1}{2}$ " wide x 3' 11" high.

4 sash frames, sills and casings, for 8" wall.

Hardware

280 lbs. 4" common nails, for framing.

300 lbs. 2 $\frac{1}{2}$ " common nails, for shiplap.

- 160 lbs. $2\frac{1}{4}$ " flooring nails, for flooring, siding, V-joint.
- 20 lbs. 2" finishing nails.
- 140 lbs. $1\frac{1}{4}$ " shingle nails, best galvanized or zinc clad.
- 16 feet door track, for sliding door.
- 2 hangers, for 2" door.
- 17 pairs 12" T hinges, for end doors.
- 12 pairs 6" T hinges, for feed chute doors.
- 20 pairs 5" strap hinges, for windows.
- 20 window catches.
- 4 hooks and eyes, 6", for lower doors.
- 3 barn door latches.
- 8 iron brackets, for door locking bars.
- 15 cow ties.
- 4 bolts, $\frac{5}{8}$ " x 6", door locking bars.
- 38 anchor bolts, $\frac{5}{8}$ " x 8", with nuts and double washers.
- 5 pieces $\frac{5}{8}$ " x 24" round iron rods, for box stall gate.
- 2 rods, $\frac{1}{2}$ " x 24", for ventilator damper pivot.
- 23 rolls tar paper.
- 22 yards gravel, for foundation.
- 120 bags cement for foundation.

Combination Barn No. 3.

This barn is 34 feet by 75 feet, with six double and one single box stalls for horses, fifteen single stalls for cows, together with a calf pen, a bull pen and a maternity box. (See Fig. 13). The barn is equipped with a central driveway through which a team and wagon may be driven, which facilitates greatly the daily removal of manure. Plank floors are used in the horse stalls and for platforms under the cows. Concrete is specified for the gutter

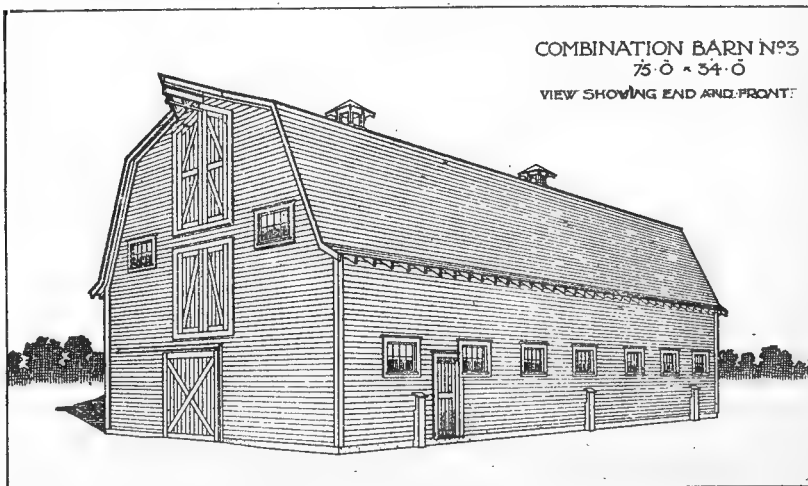
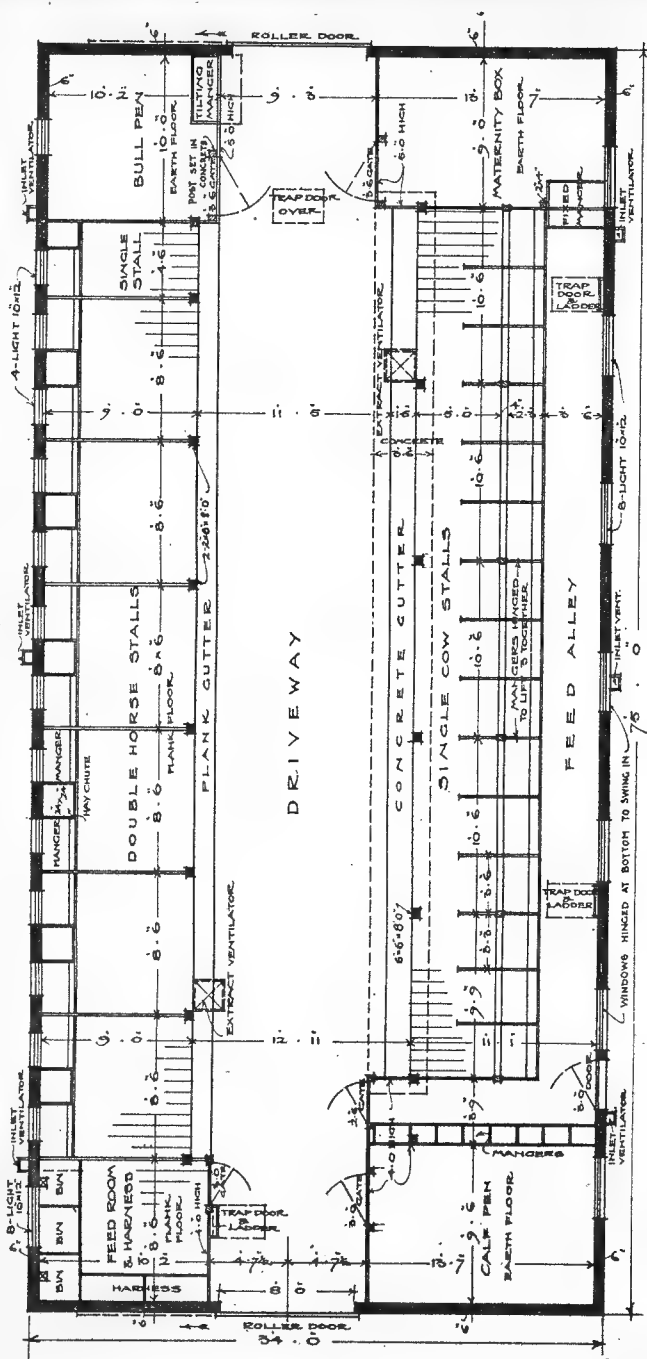


Fig. 12. Barns of this type will hold an entire winter's supply of roughage.

COMBINATION BARN NO. 3. 75' 0" x 34' 0"



NOTE: SEE SEPARATE DETAILS FOR ALL MANCERS & STALLS.

GROUND FLOOR PLAN

Fig. 13. Room for 13 horses and about 25 head of cattle, including calves. The central driveway allows easy handling of manure and bedding.

behind the cows and earth floors are shown in all the feed alleys, box stalls and driveway. The choice of flooring of course remains with the builder.

Only three doors are shown in the plan; the two end doors to the driveway, and a small door opening into the feed alley in front of the cows to provide the men with an easy entrance and a direct route to the milk house.

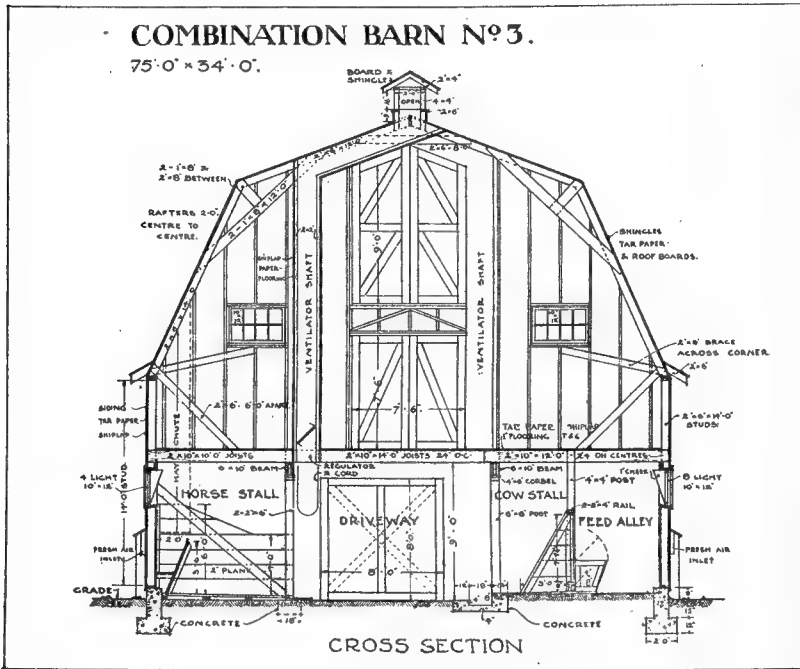


Fig. 14. The barn is economical in material, simple in construction and strong.

Bill of Materials, Combination Barn No. 3.

Framing Lumber

No. of Pcs.	Inches Thick	Inches Wide	Feet Long	Feet, Board Measure	USED FOR
2	6	8	10	80	Hay fork beams.
5	6	6	8	120	Posts, back of cow stalls.
16	4	4	10	213	Posts along cow mangers.
4	2	12	14	112	Calf pen and feed room fronts.
10	2	12	12	240	Cattle manger bottoms.
3	2	12	12	72	Maternity box stall front.
14	2	12	10	280	Cattle stall divisions.
12	2	12	10	240	Horse stall divisions at box stalls.
15	2	12	18	540	Horse stall divisions.
1	2	12	8	16	Maternity box stall manger bottom.
1	2	12	4	8	Inner side, tilting manger, bull stall.
24	2	10	16	640	Beams, built up to 6" x 10".
39	2	10	14	910	Joists.
8	2	10	14	187	Gutter, back of horse stalls.
32	2	10	14	747	Floor to cattle stalls.
39	2	10	12	780	Joists.
6	2	10	12	120	Beams, built up to 6" x 10".
1	2	10	12	20	Outer side tilting mangers, cut 2' 2".
43	2	10	10	717	Joists.
6	2	10	10	100	Bottom to horse mangers, to cut 8' 6".
11	2	10	10	183	Floor to feed room.
23	2	10	14	537	Floor to horse stalls.
35	2	10	8	467	Floor to horse stalls.
1	2	10	4	7	Front of manger, maternity stall.
1	2	10	4	7	End to tilting manger.
1	2	10	6	10	Bottom manger, single horse stall, to cut 4' 6".
10	2	8	16	213	Rafter braces.
1	2	8	8	11	Front and middle bar to maternity manger, to cut 4' 0".
1	2	8	4	5	Bottom to tilting manger.
6	2	8	14	112	Ridge pole.
10	2	8	12	160	Cattle manger sides.
15	2	8	12	240	Cattle manger fronts.
6	2	8	10	80	Horse manger bottoms.
18	2	8	10	240	Horse manger fronts.
6	2	8	10	80	Divisions, cattle mangers.
1	2	8	16	21	Divisions, cattle mangers.
2	2	8	10	26	Bottom and front manger to single horse stall, to cut 4' 6".
10	2	6	16	160	Lookouts, to cut 2' 0".
1	2	6	16	16	Cupola stool.
42	2	6	16	672	Studs, end wall.
8	2	6	8	64	Window framing, side walls.
Carried forward					9,453

Framing Lumber—Continued

No. of Pcs.	Inches Thick	Inches Wide	Feet Long	Feet, Board Measure	USED FOR
Brought forward . . .				9,453	
24	2	6	8	192	Braces, plates to joists.
38	2	6	8	304	Collar ties.
20	2	6	8	160	Posts, horse and box stalls.
4	2	6	4	16	Rails to box stall gates.
1	2	6	4	4	Bottom to tilting manger.
2	2	6	4	8	Rails to tilting manger.
80	2	6	14	1,120	Rafters.
1	2	6	14	14	Corbels on 6" x 6" posts, to cut 2' 0".
10	2	6	14	140	Studs, end walls.
78	2	6	14	1,092	Studs, side walls.
5	2	6	14	70	Window trim, side wall.
80	2	6	12	960	Rafters.
8	2	6	12	96	Braces, side wall to end wall.
6	2	6	12	72	Horse stall division braces.
7	2	6	12	84	Studs, end wall.
1	2	6	12	12	Rail, bull stall, front partition.
3	2	6	6	18	Rails, bull stall, partition.
15	2	6	10	150	Ribbon under joists.
4	2	6	8	32	Locking bars for door (loft).
4	2	6	10	40	Ridge pole brace.
2	2	6	10	20	Corbels under 6" x 6" posts, to cut 2' 0".
22	2	6	10	220	Studs, end wall.
*20	2	4	16	213	Sills and plates.
*11	2	4	14	103	Sills and plates.
*3	2	4	12	24	Sills and plates.
*21	2	4	16	224	Mud sills to plank floors.
*1	2	4	14	9	Mud sills to plank floors.
2	2	4	16	21	Mud sills to gutter.
1	2	4	14	9	Mud sills to gutter.
2	2	4	16	21	Cupola rafters.
1	2	4	16	11	Corbels over 4" x 4" posts, to cut 2' 2".
30	2	4	8	160	Studs for grain bin in loft.
3	2	4	14	28	Horse manger supports.
1	2	4	8	5	Horse manger supports.
2	2	4	12	16	Cupola plate and rafters.
10	2	4	12	80	Cattle stanchion, top support.
14	2	4	6	56	Cattle stall division cap.
8	2	4	10	53	Sills and plates to grain bin in loft.
1	2	4	10	7	Post, maternity box stall.
5	2	4	10	34	Posts, cattle stall divisions.
2	2	4	10	13	Ladder to loft.
1	2	4	5	3	Post to front partition to bull stall.
160	1	8	12	1,280	Rafter braces.
Total Framing Lbr.				16,647	

*Random lengths to make up the same total number of lineal feet will answer for these items.

Finish Lumber

No. of Pcs.	Inches Thick	Inches Wide	Feet Long	Feet, Board Measure	USED FOR
2	2	10	8	27	Door rails, rabbeted $\frac{3}{4}$ ".
2	2	10	4	13	Gate rails, bull and maternity box stall, rabbeted $\frac{3}{4}$ ".
8	2	8	8	85	Jambs, door frame, rabbeted 2".
4	2	8	8	43	Headers, door frame, rabbeted 2".
1	2	8	4	5	Header, door frame, to cut 3' 4", rab- beted 2".
1	2	8	5	5	Door sill.
1	2	8	14	19	Jamb, door frame, rabbeted 2".
4	2	8	10	53	Door frame sills.
2	2	8	18	48	Jambs, door frame, rabbeted 2".
1	2	8	18	24	Headers, door frame, rabbeted 2".
16	2	6	8	128	Door stiles, rabbeted $\frac{3}{4}$ ".
12	2	6	4	48	Door rails, rabbeted $\frac{3}{4}$ ".
1	2	6	14	14	Door stiles, rabbeted $\frac{3}{4}$ ".
4	2	6	12	48	Door stiles, rabbeted $\frac{3}{4}$ ".
2	2	6	10	20	Stiles, box stall gate, rabbeted $\frac{3}{4}$ ".
2	2	6	18	36	Door stiles, rabbeted $\frac{3}{4}$ ".
10	1	10	16	133	Frieze.
1	1	10	16	13	Divisions, calf manger.
1	1	10	8	7	Front of manger, maternity stall.
6	1	10	4	20	Fronts, fresh air inlets.
3	1	10	14	35	Bottom and front, calf manger.
4	1	8	14	37	Frieze.
4	1	8	12	32	Frieze.
1	1	8	6	4	Tops, fresh air inlets, to cut 12".
5	1	6	16	40	Ridge boards.
10	1	6	8	40	Door casings.
1	1	6	4	2	Front, maternity stall manger.
12	1	6	4	24	Sides, fresh air inlets.
1	1	6	4	2	Door casing.
4	1	6	14	28	Rails, calf pen.
4	1	6	14	28	Corner boards.
2	1	5	14	14	Door braces.
1	1	6	6	3	Cap, front partition, bull stall.
3	1	6	6	9	Rails, front partition, bull stall.
10	1	6	10	50	Door casing.
8	1	6	10	40	Door braces.
5	1	5	16	33	Ridge boards.
4	1	5	14	23	Corner boards.
8	1	4	4	11	Movable bars, calf pen manger.
4	1	4	14	19	Fixed bars, calf pen manger, to cut 3' 6".
14	1	4	12	56	Battens, cattle stall divisions.
15	1	4	10	50	Battens, cattle manger divisions.
14	1	4	10	47	Stops, cattle stall divisions.
7	1	3	16	28	Gates to calf pen, alley and feed room.
Total Finish Lumber 1,144					

- 14,000 feet, board measure, shiplap.
- 3,000 feet, board measure, 1" flooring, for loft.
- 4,700 feet, board measure, siding.
- 500 feet, board measure, 1" V-joint.
- 41,500 British Columbia Red Cedar shingles, edge grain (166 bundles).
- 14 sashes, 4 lights, 10" x 12".
- 14 sash frames, sills and casing, for 9" wall.
- 12 sashes, 8 lights, 10" x 12".
- 12 sash frames, sills and casing, for 9" wall.

Hardware

- 275 lbs. 4" common nails, for framing.
- 40 lbs. 3½" common nails, for plank floor.
- 280 lbs. 2¼" common nails, for shiplap.
- 200 lbs. 2¼" flooring nails, for siding and loft floor.
- 40 lbs. 2" finishing nails, for trim.
- 200 lbs. galvanized or zinc clad shingle nails.
- 2 lengths door track, 18' each.
- 6 door hangers, for 2" door.
- 7½ pairs 6" T hinges, with screws, for doors and tilting mangers.
- 10 pairs 10" strap hinges, with screws, for cow mangers.
- 10 pairs, 12" strap hinges, with screws, for loft doors.
- 22 pairs 5" strap hinges, with screws, for windows.
- 22 window catches.
- 2 hooks and eyes, 6".
- 3 door bolts, for box stall gates.
- 2 barn door latches.
- 1 iron, ¾" x 1¼" x 13' 0", for sliding bar for calf manger.
- 8 brackets, for locking bar for loft doors.
- 4 bolts, ¾" x 5", locking bar for loft doors.
- 38 anchor bolts, ⅝" x 8", with nuts and double washers.
- 8 carriage bolts, ½" x 4", for calf stanchions.
- 8 carriage bolts, ½" x 2", for calf stanchions (sliding bar).
- 2 rods, ½" x 25", and staples, for damper pivot.
- 22 rolls tar paper.
- 33 yards gravel, for foundation.
- 190 bags cement, for foundation.

Combination Barn No. 4.

This barn, 18 feet by 28 feet, is much smaller than any of the others and is of course correspondingly cheaper to construct. It provides accommodation for six horses and three cows. The horses are tied in double stalls 8 feet 6 inches in width and 9 feet long. If three cows are kept they will each have a space 2 feet 10 inches wide. This would be ample for three small cows, or for two large cows and a heifer or a calf. A plank platform 5 feet long should be provided for the cow stalls, as it is well-nigh impossible to keep them clean when earth floors are used. The remainder of the barn, however, is shown with an earth floor. Plank or concrete would be an improvement, but it is not absolutely necessary. A ladder to the

loft and a feed bin complete the equipment. This barn is intended to meet the requirements of a beginner who has only five or six work horses and two or three cows. It can later be extended at either end as necessary.

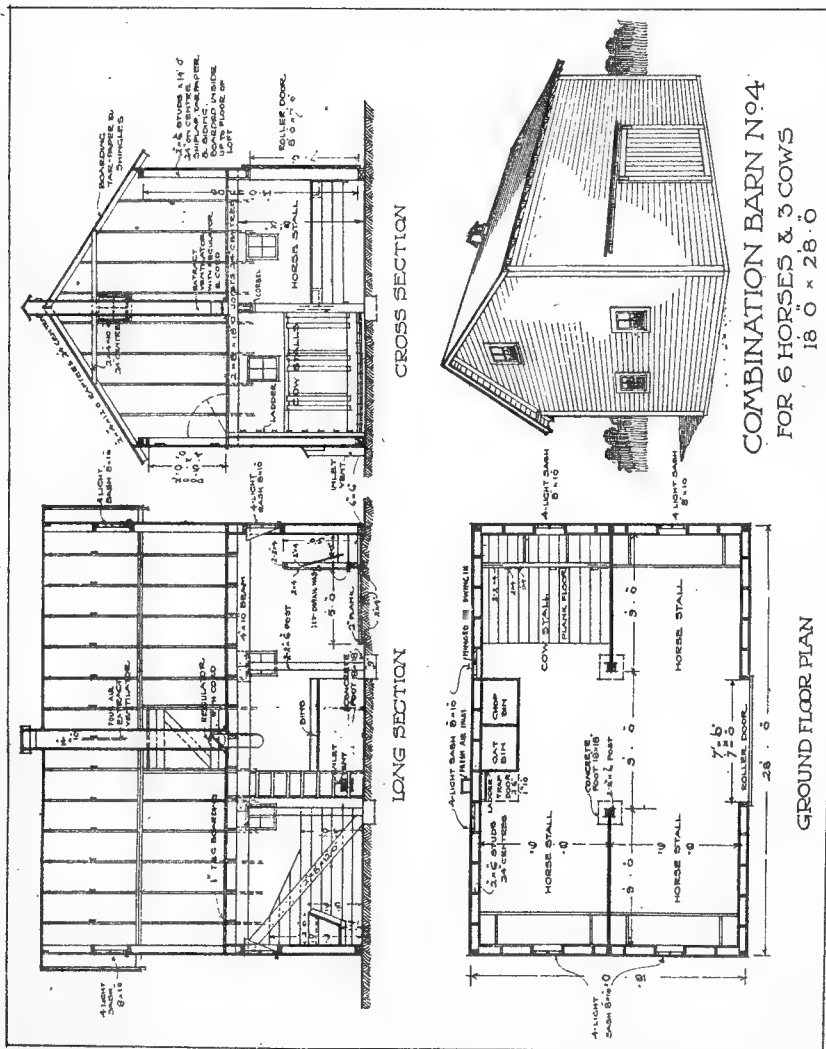


Fig. 15. A cheap barn for the beginner. Room for six horses and three cows.

Bill of Materials, Combination Barn No. 4.

Framing Lumber

No. of Pcs.	Inches Thick	Inches Wide	Feet Long	Feet, Board Measure	USED FOR
2	6	6	18	108	Mud sills.
2	6	6	14	84	Mud sills.
2	6	6	10	60	Mud sills.
2	2	12	12	48	Partitions for horse stalls.
10	2	12	10	200	Partitions for horse stalls.
2	2	12	8	32	Floor for cow stalls.
6	2	10	10	100	Beams.
3	2	10	10	50	Fronts for horse mangers.
8	2	10	8	107	Floor for cow stalls.
1	2	10	8	13	Rail for large door.
15	2	8	18	360	Joists.
2	2	8	12	32	Braces to horse stall partitions.
1	2	8	12	16	Boxes, horse mangers.
4	2	8	10	53	Cedar blocking under mud sills, to cut 20 pieces 2' 0".
6	2	8	10	80	Bottom, horse mangers.
6	2	8	10	80	Fronts for horse mangers.
2	2	8	10	27	Fronts, cow mangers.
1	2	8	8	11	Divisions, cow mangers.
4	2	6	16	64	Plates.
4	2	6	16	64	Studs for ends.
6	2	6	16	96	Studs for ends.
3	2	6	16	48	Window and door framing.
1	2	6	16	16	Ridge pole.
34	2	6	14	476	Studs.
8	2	6	14	112	Studs, ends.
4	2	6	14	56	Plates.
1	2	6	14	14	Ridge pole.
4	2	6	14	56	Ribbon under joists.
1	2	6	12	12	Studs, ends.
2	2	6	8	16	Door jambs.
1	2	6	8	8	Door header.
4	2	6	8	32	Studs under beams.
4	2	6	8	32	Posts.
3	2	6	8	24	Door stiles, rabbeted $\frac{3}{4}$ ".
1	2	6	8	8	Door rail.
2	2	6	2	4	Corbels.
34	2	4	12	272	Rafters.
2	2	4	12	16	Supports, fronts, horse mangers.
13	2	4	10	87	Collar ties.
2	2	4	10	13	Top rail, cattle mangers.
3	2	4	10	20	Vertical bars, cattle mangers.
4	2	4	10	27	Sills for cow floor.
1	2	4	10	7	Posts.
Carried forward				3,041	

Framing Lumber—Continued

No. of Pcs.	Inches Thick	Inches Wide	Feet Long	Feet, Board Measure	USED FOR
Brought forward ...				3,041	
2	2	4	9	12	Strings for ladder.
* 6	2	2	16	32	Joist bridging.
4	2	2	14	19	Ventilator.
2	2	2	12	8	Stops for horse stall partitions, to cut 4 pieces, 6' 0" long.
* 2	2	2	12	8	Joist bridging.
1	1	4	10	3	Vertical bars to cattle mangers.
1	1	2	16	3	Rungs for ladder.
Total Framing Lbr...				3,126	

*Random lengths to make up the same total number of lineal feet will answer for these items.

Finish Lumber

1	2	8	10	13	Window sills.
1	2	8	8	11	Window sills.
1	1	12	16	16	Cheeks to window.
2	1	10	16	27	Frieze.
2	1	10	14	23	Frieze.
4	1	8	16	43	Window frames.
2	1	8	14	19	Base boards.
4	1	8	12	32	Frieze ends.
6	1	8	10	40	Base boards.
1	1	6	16	8	Ridge board.
1	1	6	16	8	Cover board to roller track.
1	1	6	14	7	Ridge board.
4	1	6	14	28	Corner boards.
3	1	6	8	12	Roller door casing.
1	1	5	16	7	Ridge board.
4	1	5	14	23	Corner boards.
1	1	5	14	6	Ridge board.
4	1	4	14	19	Window casing and loft door.
2	1	4	10	7	Window casing and loft door.
1	1	4	6	2	Window casing and loft door.
4	1	2	16	11	Water table.
4	1	2	12	8	Window stops.
1	1	2	10	2	Water table.
Total Finish Lumber				372	

- 3,800 feet, board measure, shiplap, for walls, roof, bins, and extract ventilator.
- 1,800 feet, board measure, siding.
- 100 feet, board measure, V-joint, for doors.
- 630 feet, board measure, 1" flooring.
- 7,250 British Columbia Red Cedar shingles (29 bundles).
- 8 sashes, 4 lights, 8" x 10"; outside size 1' 8½" wide, 2' 1" high.

Hardware

- 60 lbs. 4" common nails, for framing.
- 75 lbs. 2½" common nails, for shiplap.
- 60 lbs. 2¼" flooring nails, for siding.
- 5 lbs. 2" finishing nails, for trim.
- 35 lbs. 1¼" galvanized zinc clad or zinc shingle nails.
- 6 pairs 4" T hinges, for windows.
- 6 window catches.
- 1 pair 6" T hinges, for trap door.
- 1 pair 6" T hinges, for loft door.
- 3 hooks and eyes, 4".
- 3 iron bars, 24" long, for cow ties.
- 16 feet single door track.
- 3 hangers and bolts, for 2" door.
- 1 bolt, ½" x 19", for damper in foul air outlet.
- 6 rolls tar paper.
- 3½ cubic feet gravel.
- 1 bag cement.

Roof Framing.

Figure 16 illustrates roof framing suitable for barns from 32 feet to 40 feet wide. The roofs shown are economical in material, simple in construction and strong, and supporting posts are unnecessary, thus allowing a clear storage space in the hay-mow.

The illustrations give the lengths and sizes of the various roof timbers. It will be noticed that no timber is longer than 16 feet, or of greater size than 2" x 6" (except the short 2" x 8" struts).

One complete set of timbers for the roof should first be laid out on the hay loft floor, and all joints very carefully marked and cut. This complete set should then be used as a pattern for all the other roof timbers, which should be cut and stacked in piles before any are erected. In cutting off lengths of rafters, etc., in order to have all lengths accurate, always work to the pattern and not to the last piece cut.

MANGERS AND STALLS.

Horse Stalls.

In Figure 17 is shown a detailed drawing of a horse stall, manger and hay chute suitable for use in any of the barns shown in this bulletin.

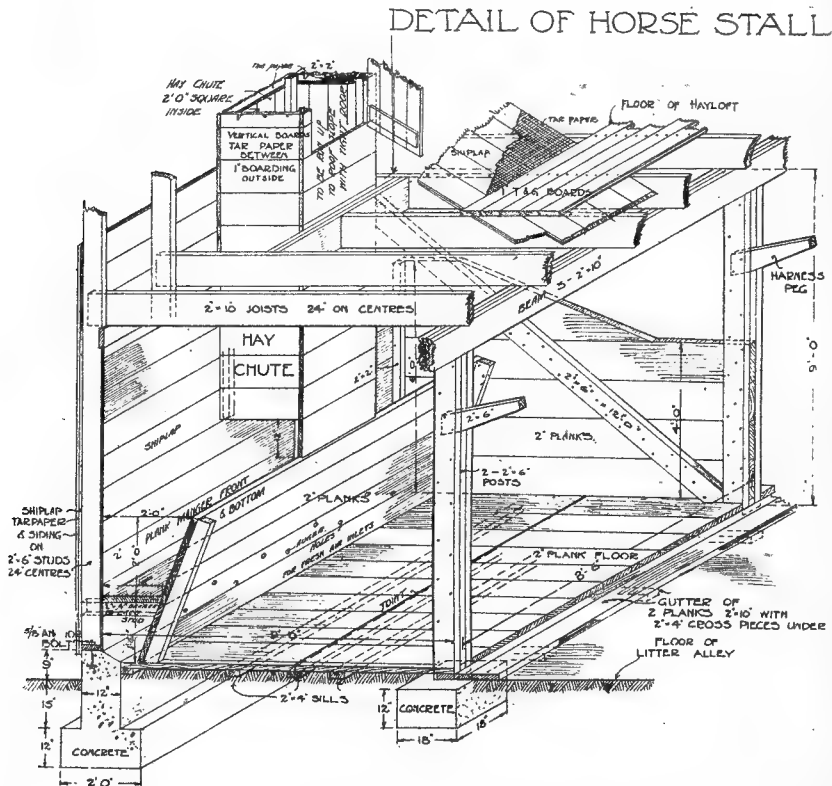


Fig. 17. A good double stall with a hay chute to the loft. The floor is built in two sections, making it easy and cheap to replace.

It is a good plan to make the plank floor of the stall in two sections, so that the back part, which always wears out sooner than the front, can be replaced when necessary, without the expense and trouble of relaying the whole floor.

The hay chutes have certain advantages, and also certain disadvantages, and can be put in or not as the builder desires; if they

are not used, trap doors should be cut over the central alley. The advantages are that they save (1) the need of a feed alley in front of the mangers, with the extra width of barn and expense that would entail; or (2) the alternative labour of carrying hay to the mangers from the central alley. The objections are (1) the risk of fire if feeding is done at night by lantern light; (2) the possibility that they may interfere with the ventilation system.

To prevent the chutes from acting as ventilators, they should be built of double ply lumber, with tight fitting doors (in the hay loft), and the doors should be kept closed except when in use. The doors should be slightly narrower than the width of the chute, in order to prevent too much hay from being put in at once. Also the chutes should be built bell shaped, larger at the bottom than the top, with the inner layer of lumber running vertically, so that the hay will fall freely without sticking.

The method of ventilating these stalls, as shown in the drawing, is simple and cheap, though it is not claimed to be the best. The idea is to have the fronts of the mangers boarded down to the floor, thus forming a long continuous box underneath the mangers (stall divisions not to run through underneath the mangers). Into this box fresh air is admitted by intakes of the usual kind through the barn wall; the fresh air is let out of the box into each stall by auger holes bored in the manger front. An objection to this plan is that draughts may be caused on the horses, although the current of fresh air is well broken up and distributed by the small auger holes.

A better method, though more expensive, is to let the fresh air in through a watertight shaft or duct carried either underneath the floor of the stall, or on the floor next the foot of the partition, to whatever point is most suitable; for example to the back of the partition, or to the passageway behind the stalls.

Cow Stalls.

Figure 18 illustrates a good type of single cow stall, simple in design and easy to build. The stall divisions are made of 2" planks, with 1" x 4" cleats on both sides; they will be found to leave ample

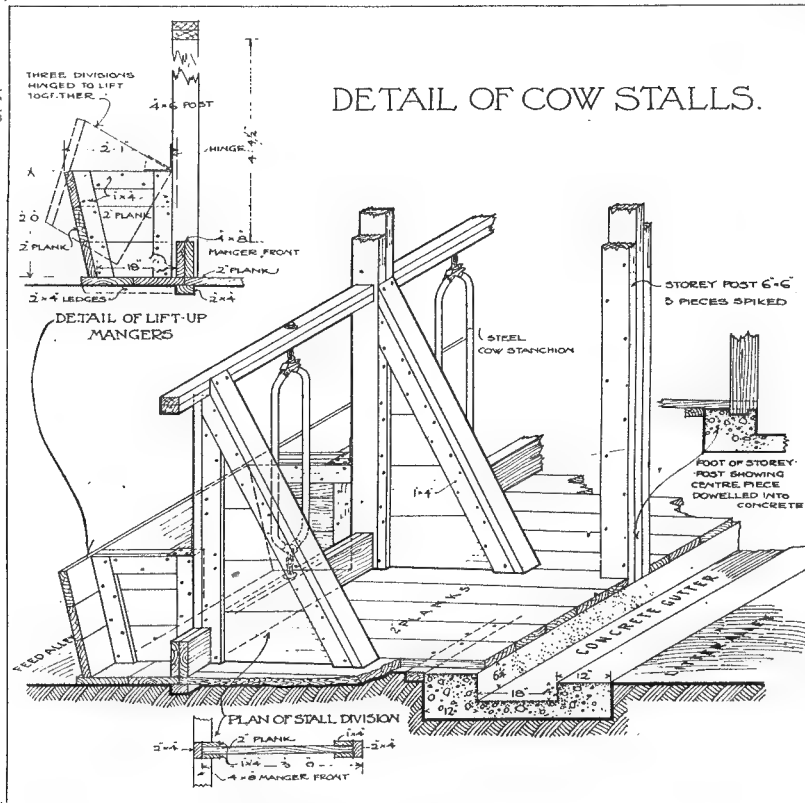


Fig. 18. A simple and serviceable single stall. The lift-up mangers make thorough cleansing easy.

room for the milker and at the same time are wide enough to prevent the cows from crowding or hooking each other. The lift-up manger is very convenient in allowing easy and thorough cleansing of the floor forming the manger bottom.

Cattle Mangers.

In Figure 19 three types of cattle mangers are shown and also one type of stall division for cows stabled in pairs.

No. 1 is a fixed or stationary manger for a box stall, and is especially suitable for bulls and steers. It is partly in the stall and partly in the feed alley, thus making it easy to put in feed from the

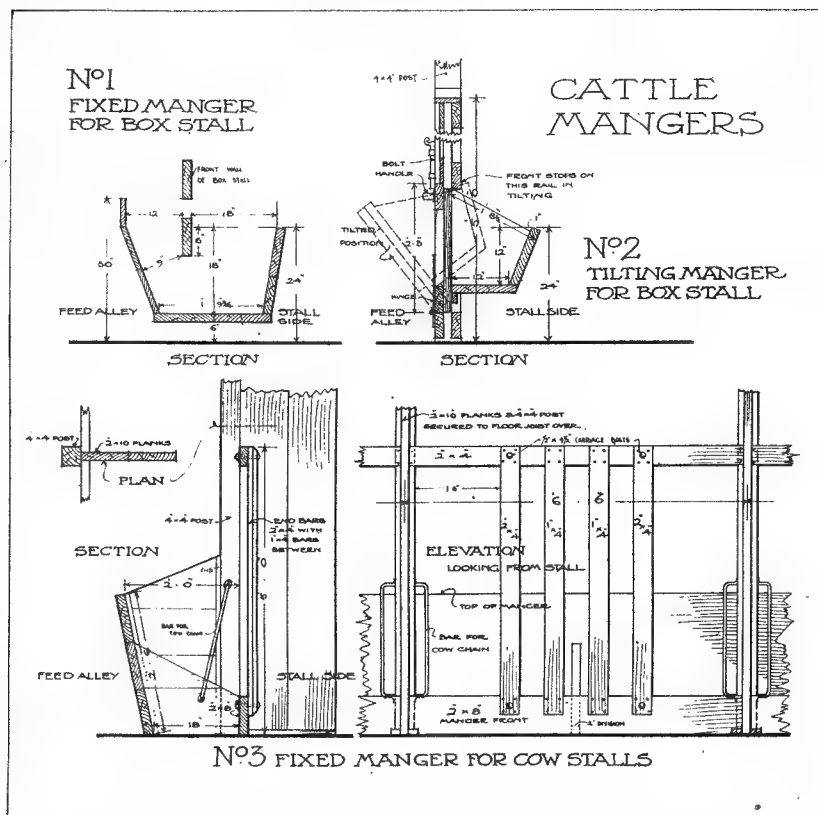


Fig. 19. Mangers that are easy to make and convenient to use.

alley without entering the stall. The partition or rail which comes below the level of the manger top holds the roughage in place and prevents the animal from throwing it out. The manger is of good size; in fact, three or four yearlings could feed out of it together.

Manger No. 2 is also intended for box stalls. It is known as a tilting manger and is hinged at the bottom so that it can be drawn forward for putting in the feed; it drops back into position by its

own weight. It is necessarily shallow and rather wasteful of feed, as there is nothing to prevent the animals from pushing the roughage out onto the floor. It is intended for use only where the feeding alley is so narrow that a projecting manger like No. 1—which is in general a more satisfactory type—would be in the way.

No. 3 is a type of fixed manger suitable for double stalls. The manger itself is simple in construction, the main features being the method of tying and the divisions between the stalls. The iron bar to which the cow's chain is attached is fixed slantwise to the side of the stall and manger partition, the lower end of the bar being placed some 6 inches farther forward than the top. This helps to keep the cow clean, because as she lies down, the chain naturally drops downward and forward and draws her well up toward the manger and away from the gutter.

The narrow division between the stalls is made of 2 planks fixed upright from floor to ceiling. It extends back from the manger plenty far enough to prevent the cows from hooking each other, but not far enough to be in the way of the cows when lying down, or of the attendants when milking.

Calf Stanchion.

Figure 20 illustrates a simple stanchion of the rigid type. It is intended for use only while the calves are fed, and for a short time afterwards to prevent them from forming the habit of sucking each other's ears, which often occurs when they feed in loose pens. The

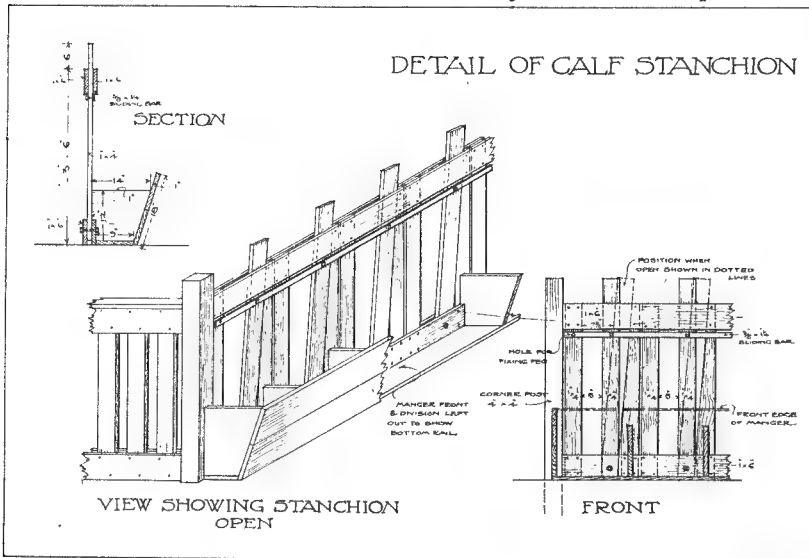


Fig. 20. Intended to hold the calves while they are being fed.

BARN VENTILATION

Fresh air ranks with sunlight as one of the prime necessities in any building used for the housing of live stock. Too much stress cannot be laid upon this point. Foul air is certain to cause disease. A stable lacking proper ventilation is neither sanitary nor comfortable. Low temperature does not mean pure air, and the purity of the air in a stable cannot be judged by its temperature.

The necessary conditions in a good ventilation system are: (1) No animal should be in a direct draught. (2) Each animal should get a sufficient amount of fresh air; no animal should be in a corner or a space where the fresh air does not circulate and from which the foul air is not carried off. (3) The currents of air should all be in the one direction—that is, away from the cold walls and towards the outlets. (4) The ventilators should be easily controlled so that in extremely cold weather the temperature need not be unduly lowered.

The Rutherford system of ventilation is used in all the barns shown in this bulletin. It is one of the best in use and is recommended by most authorities in Canada. In this system the fresh air is brought in through a number of small openings or ducts at the bottom of the outside walls, so distributed that fresh air is diffused throughout all parts of the stable. These ducts are generally raised up inside to about eight inches above the floor, so that cold draughts will not run along the floor. As it is used and becomes warmed the air moves gradually to the centre of the building and up to the ceiling and out through the outlets. There should be no cross current nor tendency to bring air once breathed and warmed in contact with the outside wall. Usually about one outlet is provided for every four inlets.

Where the mangers are against the wall (as in the horse manger, Fig. 17), it is sometimes difficult to introduce the air without causing a draught on the animals. In an experiment carried on at the Central Experimental Farm, Ottawa, to avoid this difficulty the fresh air was carried underneath the floor of the stall. Where this is done care must be taken to have the air shaft absolutely water tight. This can be ensured by using vitreous tile pipe with cemented joints. If the air is brought in at the manger it should be broken up into very small openings (auger holes) so as not to create a draught.

If there is a feed passage along the wall it makes an excellent place for bringing in the fresh air.

The air should be brought in through small openings and at frequent intervals. An opening should not be larger than 6 inches by 8 inches. Six or 4-inch tile pipes make good ducts. Eight square inches of inlet should be allowed for each cow two years old and over, and ten to twelve square inches for each horse. The inlets should be placed along the walls so that they will distribute the fresh air as far as possible throughout the entire stable. The inlets on the outside of the walls should be carried up high enough to be above the snow line and also to prevent dust and rubbish from blowing into them. The openings should be on the side walls of the inlet and not the face so that strong winds will not blow directly into them and affect the ventilation within the barn. Fly screens should be put over the openings.

The currents of air should be all in one direction—that is towards the outlets. The air breathed out by animals is heavily laden with moisture. If this moisture laden air is kept too long in contact with a cold wall or ceiling surface the moisture will be deposited in the form of hoar frost and the next mild day the walls will begin to drip. There is nothing so uncomfortable as a wet barn. When an animal gets its coat wet it has to supply sufficient animal heat to evaporate the moisture. That this waste of heat—or in other words food—is considerable is shown by the fact that it takes five and one-third times as much heat to evaporate water as it does to bring it from the freezing to the boiling point. In this connection the construction of the walls is very important. Unless they have some form of insulation such as a dead air space, it is impossible to keep them dry, except by lowering the inside temperature to approximately the same as the outside. Double walls with a dead air space between will keep dry if there is a good circulation of air. No system of ventilation will keep solid stone or cement walls dry—especially in very cold weather—unless they are wood lined (see Bulletin 78, Department of Agriculture, Ottawa).

The outlets should not be less than 16 inches square, and 24 inches is preferable. About 20 square inches of outlet space should be allowed for each animal. The outlets should be located as near the centre of the barn as possible. They should be built of

two-ply lumber with tar paper between, to make them as air-tight and as warm as possible. The air that is carried up the outlets is full of moisture, and if the outlet is cold it will soon collect a lot of hoar frost. The outlet should be built with as few angles as possible, and be carried above the ridge in the form of a cupola. In the cupola it is preferable to have the sides open rather than covered with slats. If the roof is carried well over the walls there is not much danger of the snow and rain beating in the open sides.

The ventilation system should be easily controlled. The higher the ventilator is carried the greater the amount of air it will take out of the barn. Also the greater the difference in the temperatures between the inside of the stable and the outside, the more air will be carried off. Consequently it is necessary to control the outlets with a damper, the controlling cords of which should be brought down into the stable for convenience. The exact amount of opening for different weather conditions is soon learned, and it is only a minute's job to adjust two or three ventilators before leaving for the night.

No ventilating system is automatic for all conditions of wind and temperature, but the Rutherford system can be operated with a minimum of attention and has proved to be most successful for conditions in the West.

BRITISH COLUMBIA DEPARTMENT OF LANDS

FOREST SERVICE.

HON. WILLIAM R. ROSS, K. C., *Minister of Lands.*

Wood as a Building Material

Wood is supreme for **all-round usefulness**.

It is the **cheapest** building material obtainable.

It is also the **lightest**.

It is the **strongest**, weight for weight.

It is the **easiest** to work; **any one** can use it.

A wooden building is by far the **simplest** to **erect**.

Wood is **attractive in appearance** and has **great variety and beauty** for interior finish.

Unlike metal and masonry, wood is almost a **non-conductor** of **heat and cold**.

A building with wooden walls and a wooden shingle roof is **warm** in winter and **cool** in summer and **dry** all the time.

Wood is therefore particularly **suitable** for **houses and barns**.

Wood is very **durable** in all kinds of building work **above ground**.

It will give **generations** of service, especially if well painted where exposed to the weather.

For use in **contact** with the **soil**, as mud-sills or fence-posts, a preservative should be applied or a specially resistant wood, such as Western Red Cedar, should be used.

Woods to Use

GROWN IN BRITISH COLUMBIA—MANUFACTURED IN BRITISH COLUMBIA.

Woods differ in their qualities of strength, hardness, and durability. Certain kinds are particularly suited for certain uses. It is important to use the right wood in the right place.

(1.) **General Building Work.**—Douglas Fir, Western Larch, Western Hemlock, Mountain Western Pine, Mountain and Coast Spruce, Western White Pine.

(2.) **Framing and Dimension Timber, Posts, Beams, Rafters, Studs, Sills, Plates, Joists.**—Light construction: Same as No. 1. Heavy construction: Douglas Fir, Western Larch, Western Hemlock.

(3.) **Rough Lumber or Sheathing not exposed to Weather (Inside Work or covered by Siding or Lath and Plaster).**—Any British Columbia wood.

(4.) **Rough Outside Sheathing exposed to Weather (Outbuildings, etc.)**—Douglas Fir, Western Larch, Mountain Western Pine, Western Red Cedar, Coast and Mountain Spruce, Western White Pine.

(5.) **Siding.**—Western Red Cedar, Douglas Fir, Mountain Western Pine, Mountain and Coast Spruce.

(6.) **Roofing.**—Western Red Cedar edge-grain shingles, with galvanized, zinc-clad, zinc, or copper nails.

(7.) **Flooring, Stair Stepping, Sidewalks.**—Douglas Fir, Western Larch, Western Hemlock. Use edge-grain stock for hardest wear.

(8.) **Interior Finish, Panelling, Trim.**—Douglas Fir, solid or veneer (a beautiful grain, superior to most hardwoods), Western Larch, Western Hemlock, Western Red Cedar, Mountain Western Pine, Western White Pine.

(9.) **Doors, Window-sash.**—Douglas Fir, Western Red Cedar, Western Larch, Mountain Western Pine, Western White Pine.

(10.) **Fence-pickets.**—Douglas Fir, Western Larch, Western Red Cedar, Mountain Western Pine.

(11.) **Piling, Cribbing.**—Douglas Fir, Western Larch.

(12.) **Silos, Tanks.**—Douglas Fir, Western Larch, Western Red Cedar.

(13.) **Ground-sills, Skids, Fence-posts, Poles, Conduits, Drains, and wherever Wood is in Contact with the Ground.**—Western Red Cedar or creosoted wood. Use Douglas Fir or Western Larch where strength and hardness are essential.

(14.) **Furniture, Tables, Settees, etc.**—Douglas Fir, Mountain Western Pine, Coast or Mountain Spruce, Western White Pine, Western Red Cedar.

Note.—Western Hemlock is superior in every way to Eastern Hemlock—an entirely different tree—and should not be confused with it.

In ordering lumber it is well to remember that "short" lengths (less than 10 ft.) are cheaper than long lengths (10 ft. and over), and where they can be used, it pays to specify "short" lengths. For example, it is cheaper to buy 6 and 8 foot lengths rather than to cut them out of 12 and 16 foot lengths.

BRITISH COLUMBIA FOREST SERVICE BULLETINS.

Farm Buildings Series.

1. Combination or General Purpose Barns for Prairie Farms.
2. Dairy Barns, Milk and Ice Houses for Prairie Farms.
3. Beef Cattle Barns for Prairie Farms.
4. Horse Barns for Prairie Farms.
5. Sheep Barns for Prairie Farms.
6. Piggeries and Smoke Houses for Prairie Farms.
7. Poultry Houses for Prairie Farms.
8. Implement Sheds and Granaries for Prairie Farms.
9. Silos and Root Cellars for Prairie Farms.
10. Farm Houses for Prairie Farms.

Timber Series.

11. British Columbia Box Woods.
12. How to finish British Columbia Woods.
13. British Columbia Tie Timber.
14. British Columbia Dimension Timber.

These bulletins are obtainable free from Victoria. Of the Timber Series, Bulletin No. 12, "How to finish British Columbia Woods," is of special interest to home builders and owners, carpenters, architects, and building contractors. Further information concerning British Columbia timber may be obtained by writing to the Chief Forester, Victoria, B.C.

OTHER PUBLICATIONS.

Many publications and much useful information on farming and related subjects can be obtained on request from the various Government Public Service organizations of Canada, listed below.

(1.) **Alberta:**

Department of Agriculture, Edmonton.
University of Alberta, Edmonton.
Agricultural Schools at Olds, Vermilion, and Lethbridge.
Dominion Experimental Stations at Lethbridge, Lacombe, and Fort Vermilion.

(2.) **British Columbia:**

Department of Agriculture, Victoria, B.C.
Dominion Experimental Farm, Agassiz, and Experimental Stations at Sidney, Salmon Arm, Summerland, and Invermere.

(3.) **Dominion:**

Department of Agriculture, Ottawa, Ont.
Dominion Forestry Branch, Ottawa, Ont.

(4.) **Manitoba:**

Department of Agriculture, Winnipeg.
Manitoba Agricultural College, Winnipeg.
Dominion Experimental Farm, Brandon, and Experimental Station at Morden

(5.) **Saskatchewan:**

Department of Agriculture, Regina.
University of Saskatchewan, Saskatoon.
Dominion Experimental Farm, Indian Head; Forestry Station, Indian Head; and Experimental Stations at Scott and Rosthern.

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